ENERGY AND REGIONAL INVESTMENT IN CANADA

Gordon W. Douglas
and Ellen F. Rattle

CANADIAN
ENERGY
RESEARCH
INSTITUTE

Study No. 17
March, 1983

ENERGY AND REGIONAL INVESTMENT IN CANADA

Gordon W. Douglas
and
Ellen F. Battle

ISBN-0-920522-28-9

CANADIAN ENERGY RESEARCH INSTITUTE
3512 - 33 STREET N.W.
CALGARY, ALBERTA
T2L 2A6
PRICE $20.00

March 1983

The Canadian Energy Research Institute (CERI) is a co-operative research organization sponsored by five parties: Energy, Mines and Resources Canada, the Alberta Department of Energy and Natural Resources, the Private Energy Research Association (composed of corporate and individual members from oil, gas, coal, electrical, nuclear energy and pipeline companies), The University of Calgary and the Ontario Ministry of Energy. The objectives of the Institute are to develop an economic research capability and to conduct studies that will assist industry and government in dealing with energy problems. The research program of the Institute is developed by a Board of Directors named by the sponsoring organizations. The content of the individual studies is, however, the responsibility of the authors.

In addition to undertaking studies in energy economics funded collectively by the five Institute sponsors, CERI carries out research for clients on a contractual basis.

TABLE OF CONTENTS

LIST OF FIGURES vi

LIST OF TABLES vii

PREFACE viii

EXECUTIVE SUMMARY ix

CHAPTER 1 INTRODUCTION 1

1.1 The Role of Investment 2
1.2 Concepts 3
1.3 Study Structure 5

CHAPTER 2 OVERVIEW OF CANADIAN INVESTMENT 7

2.1 The Components of Investment 7
2.2 Industrial Composition 11
2.2.1 Overview 11
2.2.2 Energy 14

CHAPTER 3 ENERGY AND REGIONAL INVESTMENT 19

3.1 Oil and Gas Mining 21
3.2 Pipeline Transport 24
3.3 Utilities 27
3.4 Manufacturing 30
3.5 Primary, Construction, and Service Industries 34

CHAPTER 4 REGIONAL ECONOMIC DISPARITY 37

4.1 Income 37
4.2 Population 39
4.3 Industrial Structure 42
4.4 Policy Measures 44

CHAPTER 5 CONCLUDING REMARKS 49

5.1 Summary 49
5.2 Characteristics of Major Energy Developments 51
5.3 Opportunities 55

FOOTNOTES 57

APPENDIX A TRENDS IN PROVINCIAL INVESTMENT 59

A.1 Newfoundland 59
A.2 Prince Edward Island 63
A.3 Nova Scotia 66
A.4 New Brunswick 71
A.5 Quebec 75
A.6 Ontario 82
A.7 Manitoba 91
A.8 Saskatchewan 96
A.9 Alberta 100
A.10 British Columbia 107

LIST OF FIGURES

2.1	Growth in Real Investment and Gross National Expenditure	8
2.2	Composition of Investment	9
2.3	Investment by Industry	12
2.4	Energy Investment Ratios	16
2.5	Capital Investment in Energy	17
3.1	Real Investment Per Capita	20
3.2	Oil and Gas Exploration and Development Expenditures	22
3.3	Oil and Gas Gathering and Transmission Pipeline Mileage	25
3.4	Utilities Investment	28
3.5	Manufacturing Investment	31
4.1	Personal Income Per Capita	38

LIST OF TABLES

4.1	Average Annual Growth Rates of Population	41
4.2	Government Transfers to Persons as a Share of Personal Income	45
5.1	Economic Comparison: Ontario and Alberta	51
A.1	Investment in Newfoundland	60
A.2	Investment in Prince Edward Island	64
A.3	Investment in Nova Scotia	67
A.4	Investment in New Brunswick	72
A.5	Investment in Quebec	76
A.6	Investment in Ontario	84
A.7	Investment in Manitoba	92
A.8	Investment in Saskatchewan	97
A.9	Investment in Alberta	101
A.10	Investment in British Columbia	109

Preface

This study arose from the perception that economic development in Canada has been shifting between regions. Moreover, it is important that a regional perspective be gained in order to understand the national economic structure. Investment is not only an engine of growth for today's economy, typically accounting for almost 25 percent of Gross National Expenditure, but more importantly it is the base on which future prosperity stands. Development of Canada's bountiful and diverse energy resources has been, and will continue to be vital to the economic development of the nation.

The research for this study was completed in the fall of 1982. We wish to thank Dr. John Dawson for providing many useful suggestions and editorial guidance. Thanks also go to our colleagues, Dr. G. E. Angevine and Z. Charles Slagorsky, who reviewed the study. Programming and graphics support was ably provided by Larry Linton, Brady Sakon, Jeannette Palin, Adele Crowley, Pamela Peake and Tim Crocker. Special thanks go to our efficient typists: Shirley Ingstrup, Dorothy Denike, Janice Tener, Arlene Ward and Carol Williams.

EXECUTIVE SUMMARY

As Canada emerges from the depths of a severe recession, with inflation and interest rates down from their recent peaks, opportunities for investment are being created. Major energy developments can provide a significant stimulus to regional economic growth in Canada, provided certain challeges can be met.

Over the 1951-81 period, Canadian energy investment, as a share of total investment, has varied dramatically from a low of 12.4 percent in 1960 to a high of 22.2 percent in 1981. Electric utilities have maintained the largest share of energy investment, averaging 53.8 percent over the 1951-81 period.

Investment, and in particular energy investment, has been a contributing factor to regional economic growth and diversification. Since 1950, a number of major energy-related developments have left their marks on the provincial and national economies--for example, the oil and gas booms in Alberta in the 1950s and 1970s, the interprovincial oil and gas pipelines in the 1950s, and the Churchill Falls and James Bay hydroelectric projects in the 1970s.

Higher oil prices in the 1970s have caused a westward shift in capital expenditures. As a result, the west has experienced faster economic growth and increased its population base. This trend has exacerbated interregional income disparities.

A wide range of energy investment opportunities currently exists in all regions of Canada. While some of these opportunities evoke public debate and are the source of political dispute (e.g., offshore oil and nuclear power), significant benefits can be achieved if energy and other investment projects proceed.

x

Chapter 1

INTRODUCTION

Canada's economy has entered the 1980s with a dismal record in generating growth and expansion of employment opportunities. In 1980 and 1981, growth in the Gross National Product was very slow; employment growth lagged and unemployment rates remained at 7.5 percent. The year 1982 was much worse, with a 5 percent decline in GNP, a 3.3 percent decline in employment and an average unemployment rate of 11 percent. Business investment, which in aggregate terms held up in 1980 and 1981, plunged in 1982; profits were down in 1981 and in 1982 they registered the sharpest drop since the 1930s. Not only investment, but all other components of demand, except for government expenditures on goods and services, also declined in 1982.

Canada has not been alone in its difficulties, although the impact of the recession has been greater than in many other countries. The economic slowdown is worldwide and the prospects for a rapid resurgence of growth are remote. The likelihood is that growth rates among the world's industrial economies will be modest in 1983, although they are expected to accelerate in subsequent years. With the excess productive capacity that exists in many industries--33 percent for Canadian manufacturing in mid-1982, for example--it will be some time before there is strong investment growth. In Canada, as in most other countries, a general resurgence of business investment will be contingent upon increased consumer demand. In selected sectors, however, including those where the lead times between investment and production are long, such as is the case with many energy investments, opportunities are already being pursued. It is worth noting also that, with the decline that has occurred in interest rates, growth in housing demand is creating increased investment in that sector.

It is in this context that one should view the evolution of investment in Canada over the past thirty years and

draw out of that experience what is pertinent for the future development of Canada and its regions. Since 1950, there have been significant changes in the magnitude and composition of capital expenditures throughout Canada. During this period, energy-related investment has provided a major impetus to the changing regional economic structure. The first objective of this study is to examine the historical record of regional investment since 1950. The importance of capital investment to the national and provincial economies will be addressed, paying particular attention to the relative importance of energy-related expenditures. Secondly, other economic and demographic changes will be summarized in order to put the changing investment patterns in perspective.

While no attempt is made to extrapolate historical trends into the 1980s, it is hoped that the discussion of capital spending patterns over the last three decades will provide some insights into the potential repercussions of large energy projects. This is particularly relevant in light of recent cancellations of 'megaprojects' and the general uncertainty surrounding them. Once the tentative steps towards a resurgence of growth in Canada and other countries become more assured, investment will increase in energy and other sectors of the economy and will include small as well as large projects. The earlier these opportunities are perceived the better the country will be able to meet the energy and other requirements of future years.

1.1 The Role of Investment

Investment plays two important roles in the economy. First, it generates income and employment. The construction of buildings and houses and the purchase of machines, tools and other equipment cause direct employment in order to produce these items. Payments to workers constitute income which, as it is respent, generates multiplier effects throughout the economy.

In its second role, investment creates the capacity to produce and consume more in the future. Expenditures on the purchase of capital equipment are, in fact, foregone current consumption in order to augment future production and

consumption. Investment is undertaken when the capital stock is insufficient to meet expected or desired demand.

The impact that investment has on a region's income and employment occurs in two phases. As the capital is put in place, materials purchased, construction workers hired, etc., opportunities are created for local suppliers. Inter-industry linkages allow this impact to permeate the economy. Then, once the capital is in place, its utilization gives rise to further employment opportunities and material purchases.

The importance of investment in stimulating regional economic growth has long been acknowledged. Neoclassical growth theory emphasizes the role of supply-side parameters such as the rate of capital accumulation, growth of the labour force, and technological change. In Canada, government policy at both the federal and provincial levels has attempted to reduce the regional disparities arising from differences in industrial structure, productivity and natural resource endowments. To this end, governments have encouraged investment in slower growing areas through the use of subsidies and tax incentives.

1.2 Concepts

According to its economic definition, investment is the flow of additions to the capital stock. The capital stock is a measure of the productive capacity of a nation or region and has three dimensions: physical capital, human capital, and natural resources. In broad terms, therefore, investment can be thought of as an increase in productive capacity whether it be an increase in physical capital such as a new factory, an addition to human capital such as increased education standards, or a discovery of natural resources such as an oil field.

For the purposes of this study, we adopt a national income accounting definition of investment which takes into account mainly the physical additions to productive capacity. There are three major categories of investment: residential construction, non-residential construction, and machinery and equipment. Residential construction refers to

the expenditure on housing undertaken by the private sector (a small amount of residential construction is undertaken by federal government departments, e.g., Indian and Northern Affairs) and includes: outlays for new permanent housing in the form of single detached dwellings, doubles, row housing and apartments; conversion expenditures; costs of additions, alterations and improvements; supplementary costs including architectural and legal fees; and transfer costs on sales of existing housing.

Non-residential construction includes both building and engineering construction. Engineering construction encompasses roads, railways, pipelines, transmission lines, airports, oil and gas drilling, and mine development. Expenditures for the acquisition of land, mineral deposits and timber tracts are not defined as investment expenditures since they do not constitute the production of goods or services. Expenditures for site preparation and improvement, and mining exploration and development costs are included; that is, outlays to discover, develop and bring into use natural resources are classified as capital expenditures. However, the value of these investments is not necessarily equal to the capitalized value of the natural resource which is, of course, the addition to productive capacity. Geological and geophysical survey expenditures, while contributing to the discovery of natural resources, are not included in the estimates of gross fixed capital formation.

Investment in machinery and equipment consists of expenditures on durable tangible goods that can be removed without altering the structures in which they are housed. Installation costs are added to delivered costs in determining investment expenditures.

Investment by industrial sectors will also be examined including non-residential construction and machinery and equipment. The sub-classification of energy investment covers capital expenditures on oil and gas mining, electric utilities, pipeline transport, gas distribution utilities, coal mining, uranium mining and petroleum refining and marketing. Petrochemicals have become an increasingly important energy industry. However, data for the petrochemical

sector are typically included with other chemical and fertilizer industry data.

Excluded from our definition of investment are ordinary repair and maintenance expenditures. Government purchases of military equipment such as rifles, tanks and jet aircraft are treated as current, not capital, expenditures. Also excluded is the value of physical change in inventories. While inventory investment is an important item, lack of regional data necessitated its exclusion from this study. Expenditures on the acquisition of used structures and second-hand equipment are omitted as well, since such items are not part of the production process. However, imports of used machinery and equipment are included in capital investment. Investment in financial instruments such as stocks and bonds are excluded because they relate to financial capital rather than real physical capital.

1.3 Study Structure

This study is organized as follows. Chapter 2 contains a discussion of national trends in energy-related and other investment spending. Chapter 3 and the Appendix are focussed on investment trends on a regional basis. In Chapter 4, regional economic trends and differences are examined from a broader economic perspective, with attention to income differentials, demographic shifts, changes in industrial structure, and public policy measures. Some concluding observations are provided in the final chapter.

Chapter 2

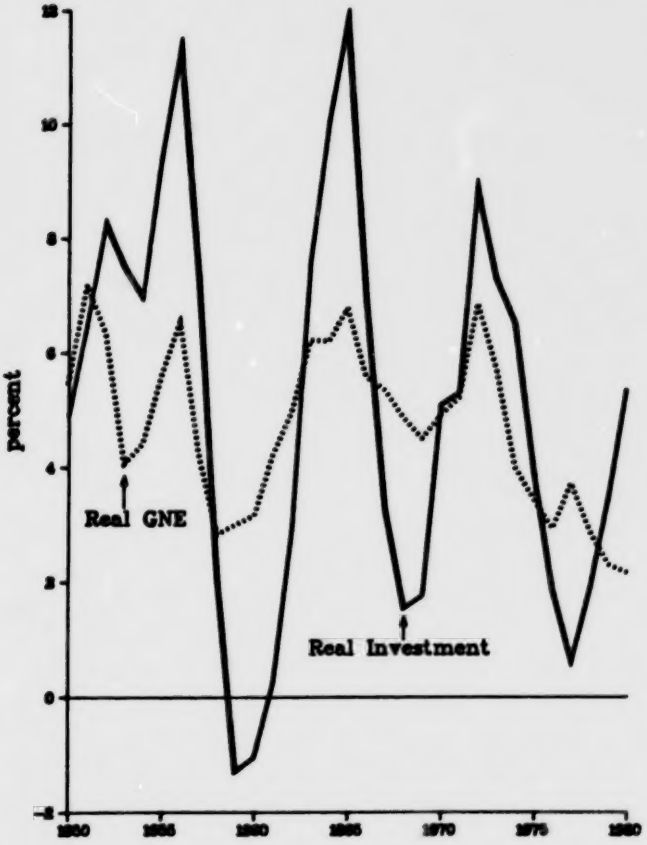
OVERVIEW OF CANADIAN INVESTMENT

Investment has long been a major engine of growth in the Canadian economy. In Figure 2.1, the growth in total fixed investment in Canada and the growth in Gross National Expenditure (GNE) are depicted. During the period 1950 to 1980, GNE grew by an average of 4.75 percent while investment averaged 4.8 percent.[1] Thus, abstracting from short-term cyclical movement, investment's share of GNE has remained relatively stable over the last three decades.

To avoid the short-term variations, three-year moving averages of real investment and GNE have been used. Nevertheless, Figure 2.1 indicates the highly volatile and cyclical nature of investment expenditures. Since 1950, the Canadian economy has passed through several business cycles. Periods of relative economic strength such as the mid-1950s and early 1970s were associated with surges of capital formation. Total capital formation as a share of GNE averaged 22 percent between 1950 and 1980. During the boom of the 1950s, investment reached a peak of 25.2 percent of GNE. The relative peaks of 1966 and 1975 were somewhat lower at 24.1 percent and 23.6 percent, respectively. At the beginning of the 1980s, investment as a percent of GNE was still rising. By 1982, however, there was a sharp reversal, with real investment declining about 15 percent and real GNE down 5 percent.

2.1 The Components of Investment

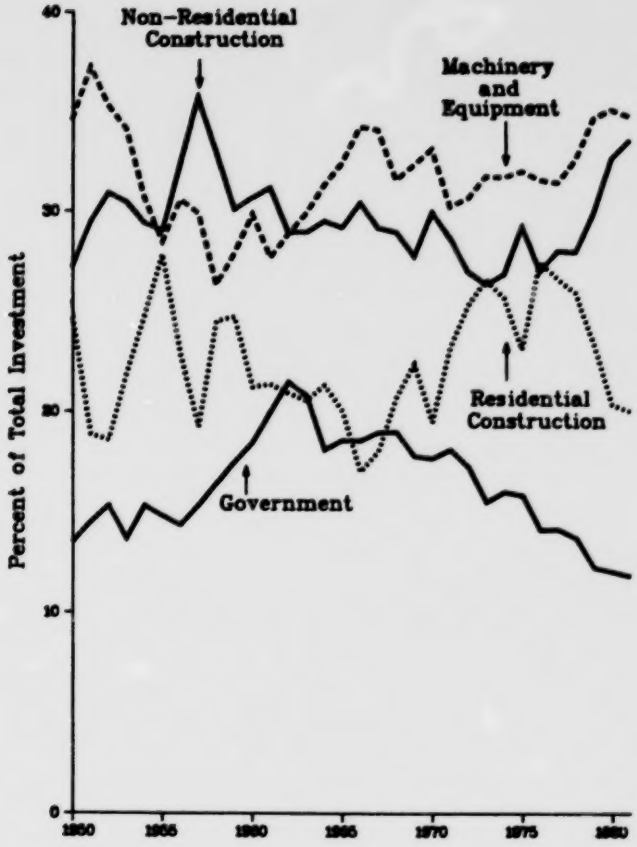
The major components of capital investment are shown in Figure 2.2, which plots their percentage shares of total investment. Business non-residential investment is broken down into two key elements: machinery and equipment, and non-residential construction. As a share of total investment, expenditures on machinery and equipment have been rising since the early 1960s which marked the bottom of a steady downward trend through the 1950s. This rise can be



Source: Based on data from Statistics Canada: Canadian Statistical Review, 11-003.

Note: Data are percentage changes of three year moving averages of real investment and GNE.

Figure 2.1: Growth in Real Investment and Gross National Expenditure



Source: Based on data from Statistics Canada, Canadian Statisical Review, 11-003.

Figure 2.2: Composition of Investment

attributed to a number of factors including the rapid growth in the commercial services industry from the 1950s on. Most of the investment in that industry has been in machinery and equipment. This has been part of a general trend in most industries towards purchases of machinery and equipment relative to investment in structures, largely because of their contribution to productivity growth. Indeed, this trend was instrumental in the strong productivity performance of the 1960s and early 1970s. In the early years of the 1980s, however, investment in machinery and equipment has been accounting for less of the total.

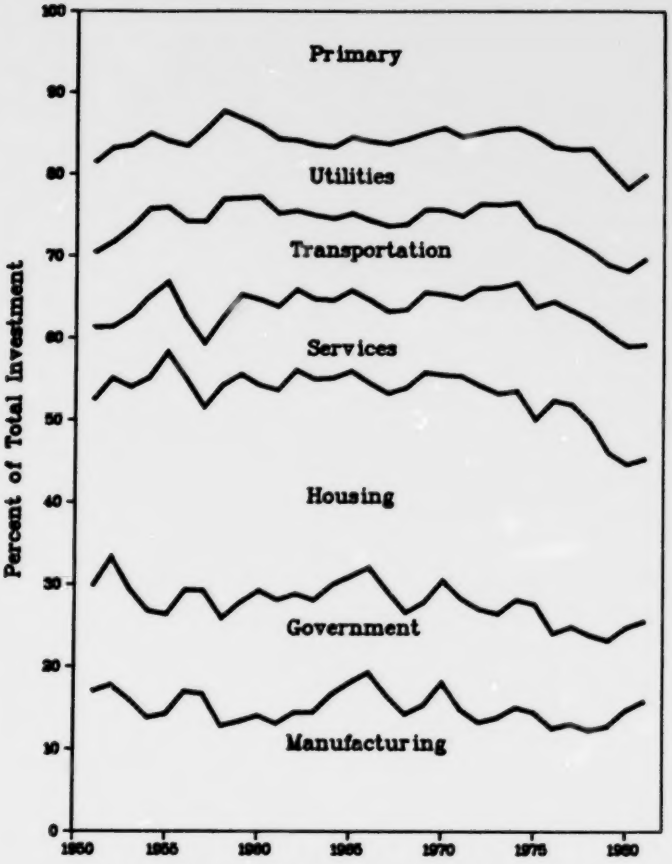
Residential construction has passed through several periods of expansion and slowdown. Housing expenditures increased at an average annual rate of 7.1 percent during the 1950s. That surge in housing demand followed from heavy immigration and the increased needs associated with the post-war baby boom. Furthermore, the 1954 revision of the Bank Act enabled banks to enter the mortgage market, which they did in large volume. The year 1960 saw housing expenditures fall below the 1955 level, and for the rest of the decade they increased moderately at an average annual rate of 5.1 percent. In the early 1970s, there was another surge in housing demand, this time due to high rates of family formation as the baby boom entered the work force, became employed and subsequently married. New housing was encouraged by a number of government incentive schemes including the Assisted Home Ownership Programme, the Assisted Rental Programme, and a tax measure permitting capital cost allowances on new multiple unit residential buildings. Investment peaked in 1976 with 273 thousand housing starts. The latter half of the 1970s was then characterized by lower rates of family formation, lower levels of immigration and high mortgage interest rates. The vacancy rate reached 8 percent of the housing stock, as compared to its 1970 rate of 2 percent. All these factors, in turn, combined to dampen housing demand such that by 1979 housing starts were below 200 thousand units for the first time since 1970. In 1980 and 1981, starts averaged about 170 thousand units but dropped even further to less than 150 thousand units in 1982. With lower interest rates, some resurgence is expected in 1983.

Government investment as a proportion of total investment steadily increased throughout the 1950s to a peak of 21.4 percent in 1962. (It excludes the investment of government Crown corporations which are included with other business investment as components of non-residential construction and machinery and equipment.) The increase was due to demographic factors such as the impact of the baby boom on school construction and the effect of growth in automobile use on highway development. The average rate of growth in government investment during the 1950s was approximately 10.4 percent. Growth subsequently slowed in the 1960s and averaged about 5.1 percent per year. Since 1967, there has been a steady downward trend in the relative importance of government investment. In real terms, this item of government expenditure peaked again in 1975 at just over $4 billion and declined absolutely every year since. A major determinant in this trend has been the dramatic tailing off of school construction, which declined in real terms from $750 million in 1968 to $300 million in 1979.

2.2 Industrial Composition

2.2.1 Overview

Trends in investment by industrial sector are presented in Figure 2.3. The primary sector's share of total investment increased from 14.9 percent in 1970 to 21.7 percent by 1980, as a result of developments in the oil and gas industry. Although it experienced significant short-term fluctuation, manufacturing's share remained fairly constant over the long term, averaging 15 percent between 1951 and 1980. Transportation's share generally declined from its 1957-58 peak which marked the construction of Trans-Canada Pipelines' gas pipeline from Alberta to Ontario. Both the service industries and utilities increased their respective shares. Investment in services continually grew faster than total investment, raising its share of total investment from 8.8 percent in 1951 to 14.4 percent in 1980. Utilities' share of total investment peaked in the late 1970s, with electric utilities building to meet projected high demand. Earlier peaks in the beginning of the 1950s, 1957-58, and 1967-70 correspond to periods of major hydro development in Ontario and Newfoundland.



Source: Based on data from Statistics Canada, Private and Public Investment in Canada, 61–206.

Note: Primary includes Agriculture, Forestry, Fishing, Mining and Construction.

Figure 2.3: Investment by Industry

The data for primary investment reflect the series of resource booms which have had a special significance in the Canadian economy. The first post-war resource boom lasted through the mid-1950s and was centered in Canada's west. Specifically, it was the discovery of major oil bearing structures in Alberta's sedimentary basin which supplied a major impetus to economic growth. Between 1947 (the discovery of Leduc) and 1957, petroleum industry expenditures on exploration increased 14 times and development expenditures 25 times. Over 5 percent of business non-residential investment in 1957 was undertaken by the petroleum industry.

Oil and gas were products whose development had many spin-offs because of numerous linkages with other sectors of the economy. Manufacturing products such as steel and pipe were in great demand. The construction of pipelines to move output to markets was an important stimulus to the provincial and national economies. Refineries and petrochemical plants grew up as a result of secure, plentiful feedstock. Of paramount importance to local economies was the wide range of service industries which developed to support oil and gas exploration and development.

The 1960s were a period of strength for many sectors of the economy, with investment booming in the 1962-66 period. The prairie provinces were prosperous due to large wheat sales to Russia and China. Canadian manufacturing, concentrated in Ontario and Quebec, was stimulated by these sales and by a number of other factors including the 1962 devaluation of the Canadian dollar, the buoyancy of the U.S. economy, and the Canada-U.S. Auto Pact of 1965. Canadian industry in general demonstrated greater skill and success in securing new foreign markets for its products. The Kennedy Round of tariff cuts enacted in 1967 opened up more export opportunities for Canadian goods by permitting increased economies of scale and specialization.

The 1970s were a time of strength for some regions and industries and of weakness for others. Growth in Canadian manufacturing slowed considerably relative to the 1960s. This was due in part to the impact of higher energy prices and growing competition for international markets. Moreover, in late 1975 and 1976, the Canadian dollar appreciated

vis-a-vis the U.S. dollar. The acceleration of the domestic inflation rate and high wage settlements further reduced Canada's ability to compete in world markets. As in the early 1950s, the strongest sector in the national economy was oil and gas exploration and development, particularly within Alberta. The frontier areas--the Beaufort Sea, Arctic Islands and eastern continental shelf--all received considerable attention from oil companies, but the majority of exploration and development funds was spent in Alberta.

The oil and gas boom of the 1970s differed fundamentally from the 1950s boom. While the Leduc discovery in 1947 was not the first show of oil in Alberta, it touched off a series of discoveries which cumulatively strengthened the whole economy. The 1970s boom was instigated by high prices imposed by the OPEC oil cartel. These high prices not only stimulated investment in the oil and gas sector, but also generated a westward transfer of wealth from provinces consuming domestic oil. Thus, while Canada's industrial heartland did benefit to a certain extent from increased activity in the west--just as it did in the 1950s--these benefits were offset by a transfer of funds to western governments, citizens and corporations. Accompanying this wealth transfer were a shift in interprovincial migration trends and, in the opinion of many Canadians, a westward realignment of economic power and activity. A major question for the 1980s relates to how permanent these shifts will prove to be.

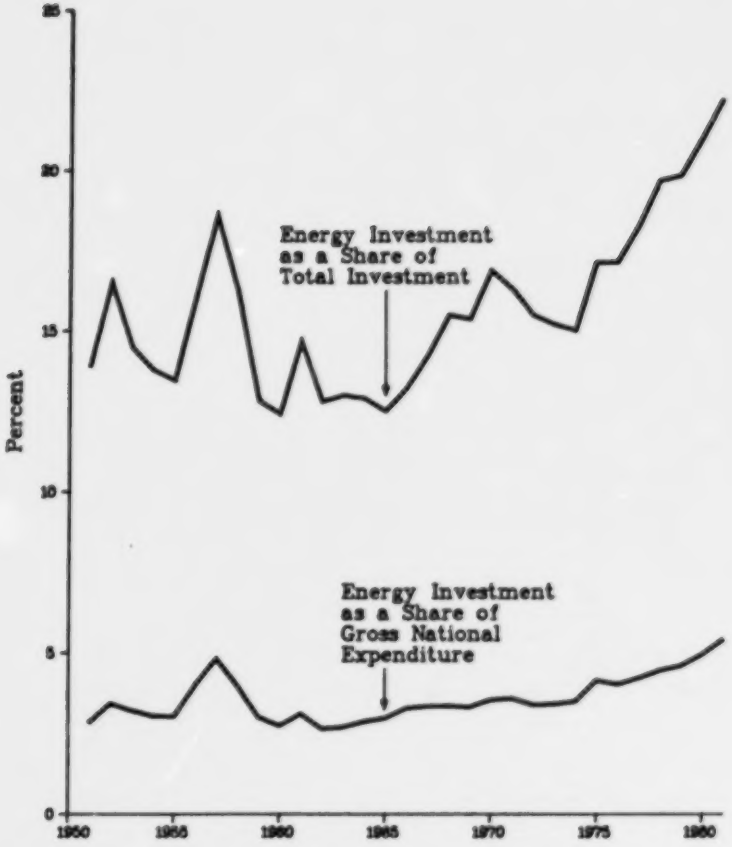
2.2.2 Energy

At one time or another, each of Canada's regional economies has been stimulated by energy-related investment expenditures. Included here are investment in oil and gas exploration and development, electric utilities, pipeline transport, gas utilities, coal and uranium mining and petroleum refining and marketing. Energy investment thus includes capital expenditures in several of the industry groups discussed in the preceding section, including the primary industries, utilities, transportation and manufacturing. Because of its capital intensity and the general 'lumpiness' of its capital expenditures, fluctuations in energy sector investment have had a strong impact on the national and provincial economies.

Figure 2.4 shows energy investment as a percentage of total output and of total investment. As a share of GNE, energy investment has been rising steadily since the early 1960s, from a low of 2.7 percent in 1962 to a high of 5.0 percent in 1980. This ratio had reached an earlier peak of 4.8 percent in 1957, due to major expenditures on pipeline construction, and oil and gas exploration and development.

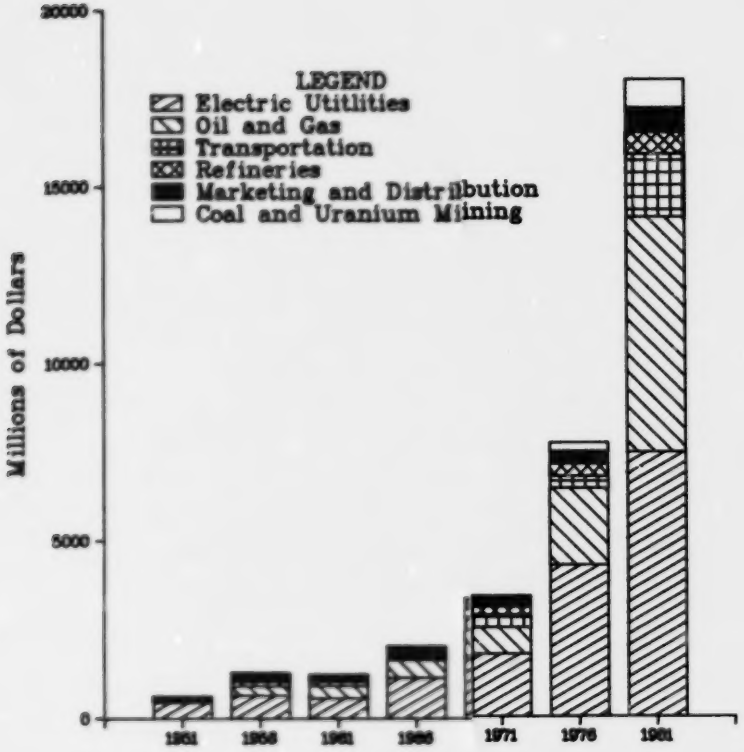
Energy investment as a share of total investment has been more volatile. In 1957, 18.6 percent of all investment in Canada was energy-related, falling to 12.4 percent in 1960. The upward trend to 1970 can be attributed mainly to hydroelectric generation projects in Newfoundland, Quebec, Manitoba and British Columbia. Between 1970 and 1974, energy's share declined somewhat, but then began to rise again in 1975 with the aftermath of the OPEC price increases. Major initiatives in frontier oil and gas exploration took place as attention turned to the Beaufort Sea, the Arctic Islands, and the eastern continental shelf, where substantial discoveries were made in the late 1970s. The Syncrude oil sands project was developed during this period. There were also some large investments undertaken by electric utilities during the latter half of the decade including the James Bay project in Quebec, the Bruce nuclear power station development in Ontario, and hydro projects in Manitoba and British Columbia. This increase in utility investment was based on an extrapolation of pre-OPEC demand trends and an expected substitution away from oil and gas to electricity.

When it comes to the industry mix of energy investment, expenditures by electric utilities have accounted for the largest proportion of total energy investment, averaging 53.8 percent over the 1951-81 period (see Figure 2.5). The totals shown rise sharply because both real and price effects are included in the current dollar totals. The 1981 decline in electric utilities' share reflects a response to lower demand growth than anticipated in industry forecasts. Capital expenditures in the oil and gas sector increased from 21.8 percent of energy investment in 1971 to 43.3 percent in 1980, falling off to 36.9 percent in 1981. Transportation's share declined during the 1970s as the major oil and gas pipeline construction of the 1950s and 1960s gave way to smaller distribution and looping projects. A spurt of



Source: Based on data from Statistics Canada, Canadian Statistical Review, 11-003; Investment Statistics Manufacturing Sub-industries and Selected Energy Related Industries, Outlook, 61-214; and Investment Statistics Service Bulletin, 61-007.

Figure 2.4: Energy Investment Ratios



Source: Statistics Canada, Investment Statistics: Manufacturing Sub-industries and Selected Energy Related Industries, Outlook, 61-214; and Investment Statistics Service Bulletin, 61-007.

Note: Data for Coal and Uranium mining are not available until after 1961.

Figure 2.5: Capital Investment in Energy

activity in 1981, in which transportation reached 9.9 percent of energy investment, was caused by expenditures on the pre-build section of the Alaska highway gas pipeline and on the extension of the Trans-Canada gas pipeline east of Montreal.

Of the other components of energy investment, the proportion given by marketing and distribution, and refining and processing fell throughout the 1970s. The decline in refining can be traced to the fact that most of Canada's oil-refining capacity was installed before 1960 and that, towards the end of the 1970s, refining surpluses appeared due to higher prices, slower economic growth and increased conservation. These surpluses have since become more acute and a number of refineries have been closed. Coal and uranium mining averaged a mere 2.3 percent of total energy investment between 1962 and 1981. However, these industries experienced rapid growth at an average annual rate of 26.9 percent in nominal terms over the period. Markets for Canadian coal in the Far East were being developed while, in the late 1970s, higher prices, increased world demand and domestic CANDU orders sparked a major exploration and development effort in uranium mining. Investment in uranium mining has recently slowed but coal mining investment continues at a substantial rate with the development of northeastern British Columbia coal and a number of other thermal coal projects elsewhere.

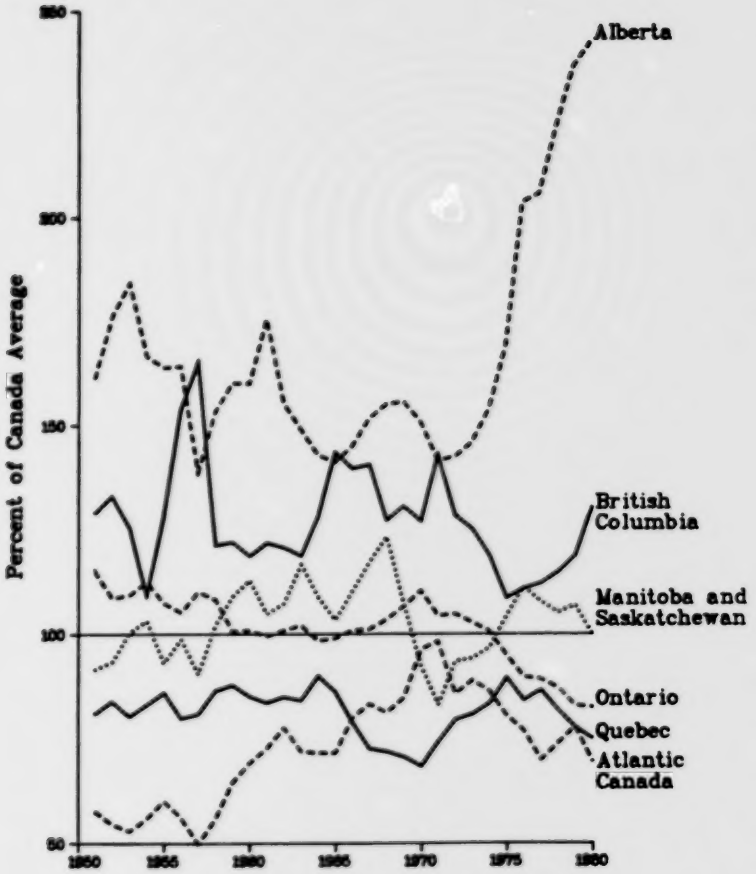
Chapter 3

ENERGY AND REGIONAL INVESTMENT

There are two principal reasons why investment levels differ among Canada's regions. The first relates to differences in capital intensity across industries. Thus, regions whose economies are heavily weighted towards agriculture, mining, forestry or utilities tend to have higher levels of per capita investment. Provinces dominated by tertiary industries characteristically demonstrate lower rates of investment. Second, investment opportunities vary with regional economic factors such as population, resource endowment and geographical location.

Figure 3.1 shows the trends in real investment per capita since 1951 for each of Canada's regions. The generally high level of per capita investment in western Canada reflects the capital intensity of the region's resource industries--oil and gas, other mining, agriculture, electric power and forestry. Rising levels of investment in Alberta in the 1970s were a result of higher oil prices which increased the expected rate of return on investment in the oil and gas sector.

Ontario approximates the national average in per capita investment. Although its resource endowment is limited compared to other provinces, capital spending has been sustained by developments in mining and capital intensive manufacturing such as pulp and paper. Moreover, its diversification and agglomeration economies have given rise to a wider range of investment opportunities. The decline in the province's investment rate during the 1970s in part reflects a reduction in opportunities. However, it should be noted that huge increases in capital spending in Alberta over the period served to pull up the national average, creating relative declines in other provinces. The comparatively poor performances of Quebec and the Atlantic provinces are attributable to both a lack of investment opportunities and an attraction of resources, including capital, to other parts of



Source: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

Figure 3.1: Real Investment Per Capita

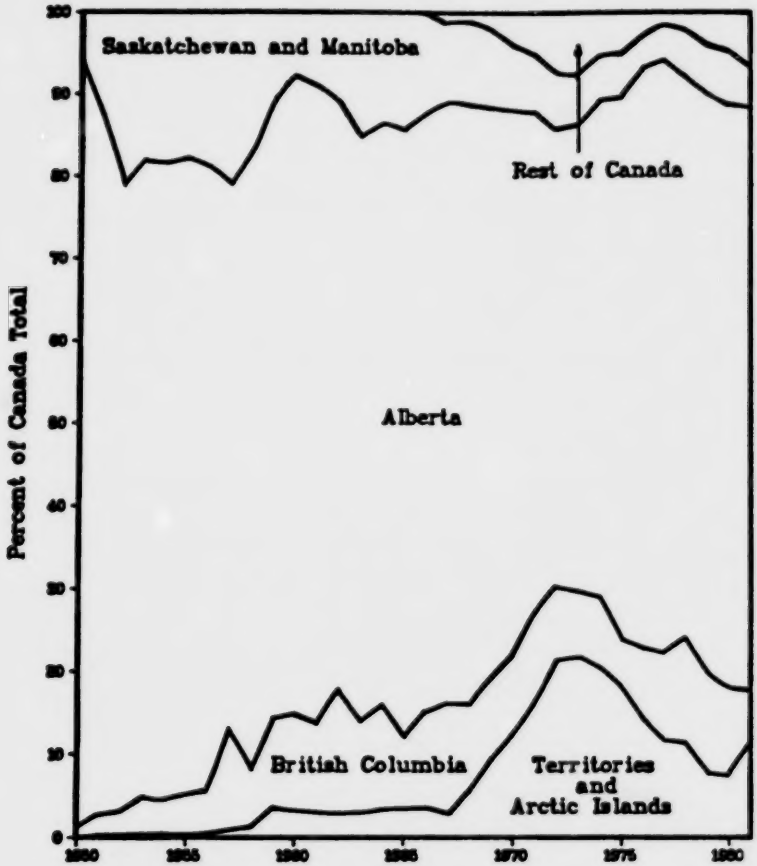
the economy. The surge in Atlantic investment in 1971-72 was due to the region's major energy development during the 30-year period, the Churchill Falls hydroelectric complex in Labrador.

In the sections that follow, the regional investment patterns in several key industries--oil and gas mining, pipeline transport, utilities and manufacturing--are surveyed for the period since 1951. Also, general developments in the primary construction and services industries are reviewed. Developments in all these industries reflect the direct and indirect impacts of energy-related capital investment. A more comprehensive and detailed examination of provincial investment trends and economic development is presented in the Appendix.

3.1 Oil and Gas Mining

The search for oil and gas has played an important role in the development of the Canadian economy. The rapid economic expansion of the 1950s was, in part, a result of the oil and gas boom in western Canada. Interindustrial linkages created spin-offs to other industries, and all regions experienced increasing economic prosperity. Similarly, rising oil and gas prices in the 1970s spurred another resource boom, although east-west wealth transfers mitigated the economic spin-off effects. Moreover, the latest resource boom has been emanating from frontier areas as well as from the prairie region, resulting in increased activity in historically less developed regions--especially the Northwest Territories, Nova Scotia and Newfoundland. In the province of Alberta, the oil and gas industry is the single most important industry, and the pace of most economic activity is related to oil and gas development. In Saskatchewan and British Columbia, hydrocarbon resource development is important but plays a relatively smaller role in these provincial economies. In recent years, commercial discoveries of oil off the coast of Newfoundland and of natural gas in Nova Scotia's offshore waters have begun to change those provinces' economic structure.

The pattern of oil and gas exploration and development expenditures is depicted in Figure 3.2. This data set



Source: Based on data from Canadian Petroleum Association, Statistical Handbook.

Note: Rest of Canada data are not available prior to 1968–1969.

Figure 3.2: Oil and Gas Exploration and Development Expenditures

is not identical to a national accounts definition of investment for it includes geological and geophysical expenditures and funds for land acquisition.

In Alberta, expenditures on oil and gas exploration and development rose steadily throughout the 1950s and 1960s at average annual rates of 7.5 percent and 7.1 percent, respectively. During the 1970s, spending increased at an average rate of 33.1 percent per year. By 1980, annual expenditures totalled $5.6 billion. Except for a brief period in the early 1970s, Alberta has been the location of over 70 percent of Canadian oil and gas capital expenditures.

Activity in offshore exploration has risen substantially since the 1960s. Between 1970 and 1975, almost 40 percent of all exploration expenditures were allocated to frontier regions. As a result, significant discoveries of oil and gas have been made. In the 1970s, almost four times the funds were spent on Arctic exploration relative to east coast exploration--$220 million versus $59 million. However, the major discoveries were off Canada's east coast, specifically oil at Hibernia and natural gas near Sable Island will likely be developed first.

The year 1981 saw a decline in expenditures by the petroleum industry. It marked the beginning of an exodus of drilling rigs south to the United States, brought about by the deregulation of oil prices in that country. In the fall of 1980, the Canadian government introduced its National Energy Program which changed substantially regulations affecting the Canadian oil and gas industry. Increased uncertainty and reduced cash flows contributed to a major slowdown in activity, and expenditures on exploration and development declined 9.6 percent. The slowdown continued through 1982 as metres drilled declined 25 percent and well completions dropped 18 percent.

Significant oil and gas capital expenditures did not occur in British Columbia until the 1950s, with production coming on stream by the middle of the decade. By 1962, exploration and development expenditures had grown such that British Columbia's share of these expenditures reached a peak of 15 percent. Expenditure growth was relatively stagnant

until the latter half of the 1970s during which activity increased substantially. The slowdown throughout the industry in 1981 hit British Columbia especially hard as oil and gas exploration and development expenditures fell by 45 percent.

Saskatchewan is Canada's second largest producer of crude oil, although production peaked in 1966. The province's share of exploration and development expenditures peaked in 1957 at 18 percent; since 1970 this share has been less than 5 percent.

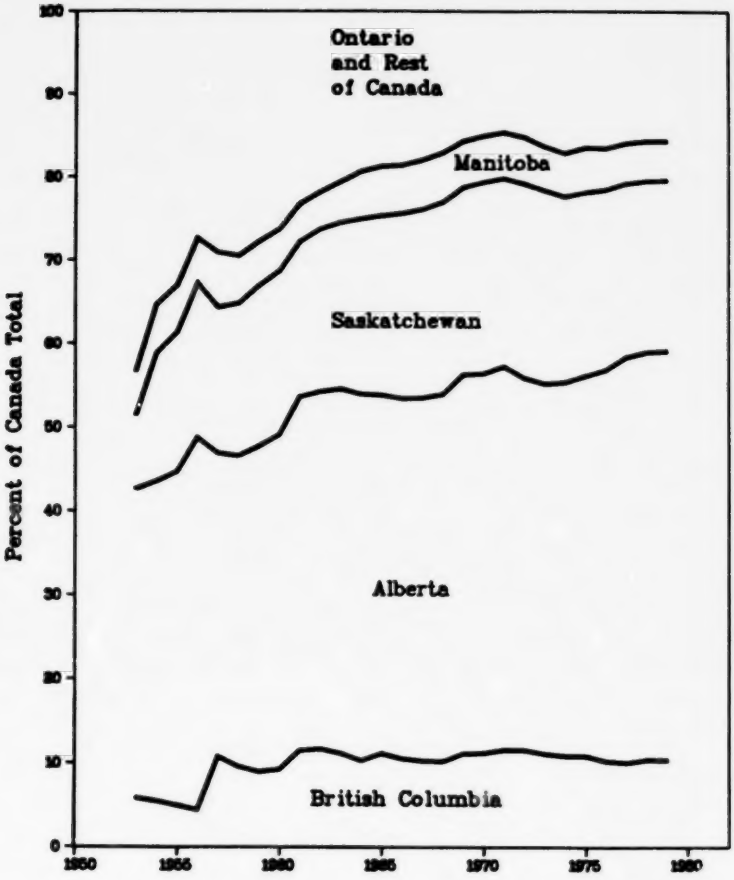
There are two commercial oil sands projects operating in Alberta: the Suncor and the Syncrude plants, which have been operating since 1967 and 1978, respectively. Between 1975 and 1981, some $3 billion were spent on exploration and development in the oil sands. Two projects scheduled for the 1980s--the Alsands plant and the Esso Resources Cold Lake plant--were cancelled in 1982, dimming prospects for large scale oil sands development over the rest of the decade.

3.2 Pipeline Transport

Over the past three decades, several major pipeline projects have exerted a significant impact on the Canadian economy. In addition, a number of regional pipeline projects have contributed to provincial income and employment growth. Aside from generating regional employment opportunities, pipeline construction has provided an important stimulus to the iron and steel industry and has fostered the development of a petrochemical industry in central Canada.

The regional distribution of pipeline mileage is shown in Figure 3.3. A major portion of this mileage relates to small diameter gathering lines in the western provinces.

As Alberta's oil and gas resources have been brought into production, an extensive gathering and transmission network has been developed. By 1960, 7800 miles of oil pipeline and 1400 miles of gas pipeline had been laid in Canada, with 40 percent of the mileage in Alberta. The 1950s witnessed construction of the Interprovincial Pipeline running from Edmonton through Saskatchewan and Manitoba to Superior, Wisconsin. The pipeline was subsequently extended to Sarnia,



Source: Based on data from Statistics Canada, Oil Pipeline Transport, 55–201 and Gas Utilities: Transport and Distribution Systems, 57–205.

Figure 3.3: Oil and Gas Gathering and Transmission Pipeline Mileage

Ontario in 1963 and to Montreal in 1976. The Transmountain oil pipeline connecting Edmonton and Vancouver was built in 1952-53. The TransCanada Pipeline was begun in 1956 in the prairie provinces and by 1958 was carrying natural gas to Ontario. In British Columbia, construction of the Westcoast Transmission natural gas pipeline occurred between 1955 and 1957, while the Inland gas pipeline was built in 1959.

In the 1960s, oil pipeline mileage was increased 118 percent and gas pipeline mileage, 81 percent. About one-half of this mileage was laid in Alberta. Much of the mileage increase in the 1960s was due to looping projects, extensions of existing lines and expansion of the gathering system. Major new projects included the Western Pacific Pipeline, connecting British Columbia's northeastern oilfields to southern markets, and a 285-mile line to carry synthetic crude from the Great Canadian Oil Sands plant (now Suncor) to Edmonton.

In the 1970s, there were more looping projects, with oil pipeline mileage being increased 27 percent and gas pipeline mileage 61 percent. The discovery of new natural gas fields in Alberta led to extensive additions to the Alberta Gas Trunk Line system.

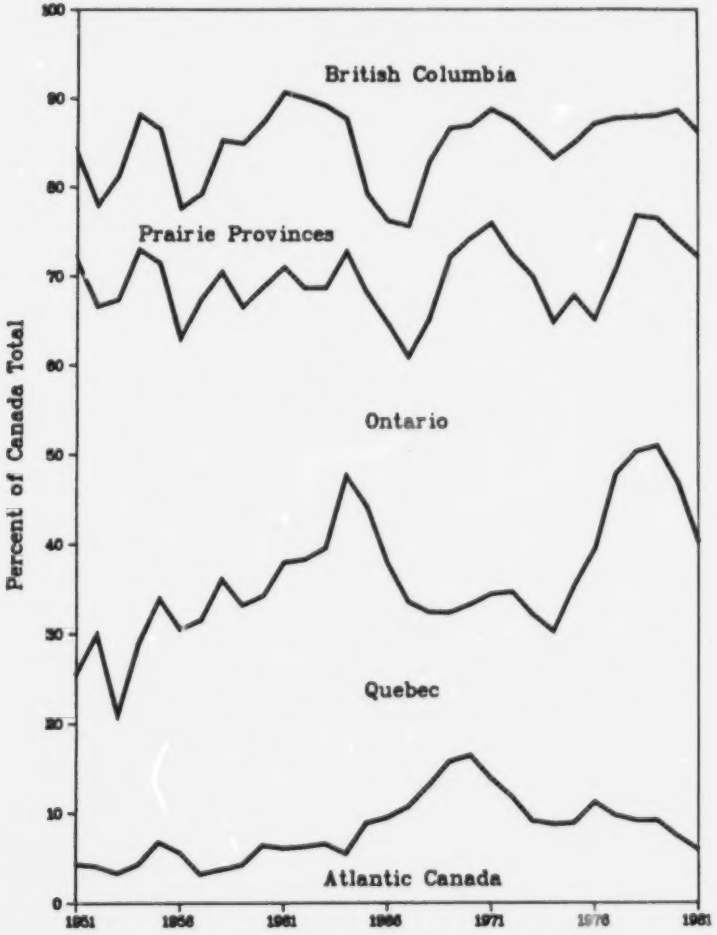
The major event in the early 1980s was the development of the 'prebuild' section of the Alaska Natural Gas Transmission System. The western leg through Alberta and the southeastern corner of British Columbia was completed in 1981. The eastern leg through Alberta and southwestern Saskatchewan was completed and put in operation in 1982. Construction of the rest of the system has been postponed because of high financing costs and flagging natural gas demand in the United States. Extension of the natural gas trunkline to Quebec City by Trans-Quebec and Maritimes Inc. began in 1981 and should be completed by 1984. British Columbia is planning the construction of a natural gas pipeline to Vancouver Island.

3.3 Utilities

Investment by utilities has provided a major stimulus to regional economies during the last thirty years. This is largely attributable to spending by the electric power industry, with its capital intensive generation projects. Generally speaking, peaks in utilities' investment have corresponded to major hydroelectric developments in the provinces, as well as nuclear power projects in Ontario. Investment remained relatively strong throughout the 1960s and 1970s, in response to high electricity demand growth. This trend continued through the late 1970s, as utilities extrapolated on pre-OPEC load growth and expanded to meet expected substitution away from oil and gas. In the early 1980s, how ver, capital spending has fallen off due to lower than anticiated demand growth and to financial pressures in the form of high interest rates and inflated construction costs. Capital spending by electric utilities will likely remain sluggish for the rest of the current decade, given reduced load growth forecasts and financial and regulatory constraints. Nevertheless, several provincial utilities have major projects in their generation expansion plans.

The regional shares of utilities investment have shown considerable variation over the historical period (see Figure 3.4). Atlantic Canada's share increased dramatically in the latter half of the 1960s, peaking at 18.0 percent in 1970. This peak reflects the height of construction activity on the Churchill Falls hydroelectric project in Labrador. Since then, the region's investment share has undergone a general decline. Development on the Lower Churchill River has been postponed, in part because it has not been possible to make transmission arrangements from proposed sites to markets.

In Quebec, the historical pattern of investment by utilities indicates large scale hydro projects in the mid-1960s and the late 1970s. The 1964 peak of 42.1 percent of Canadian utilities investment in Quebec was related to construction on the Manicougan River, where 2600 megawatts (MW) of generating capacity were installed between 1965 and 1971. Quebec's investment share subsequently fell off and did not pick up again until the early 1970s when construction



Source: Statistics Canada, Private and Public Investment in Canada, 61-206.

Figure 3.4: Utilities Investment

commenced on James Bay. After peaking at 41.8 percent in 1979, the province's share declined as much of the work on Phase I (10,300 MW) of James Bay was completed.

In 1951, Ontario accounted for almost half of the national total of investment by utilities. Its investment share then experienced a general decline, marking the end of the last period of major hydro building in the province. Ontario Hydro, the provincial utility, proceeded with a number of large thermal developments, including the Pickering A nuclear station and the Nanticoke coal-fired station. These developments were responsible for the 1970-71 investment share peak of 41 percent. Since the late 1970s, the province's share has been expanding again due to the installation of the Bruce A nuclear station and ongoing construction at the Bruce and Pickering sites.

In the prairie region, the proportion of Canadian utilities investment has remained relatively stable over the last thirty years, except for the early 1960s and mid-1970s. The early 1960s witnessed hydro projects in Manitoba and Alberta. Hydro construction in Manitoba explains the prairies' rising investment share during the early 1970s, while the 1976 peak of 21.9 percent can be attributed mainly to the Sundance coal-fired project in Alberta. Most recently, the prairies' share of total utilities investment has increased because of continuing thermal development in Alberta, where electric utilities are forecasting demand growth rates of 6 percent or higher.

The wide fluctuations in British Columbia's investment share reflect the lumpiness of hydro investment in that province. The most dramatic of these swings occurred in the mid-1960s, when hydro development was underway on the Peace River. The region's share peaked at 24 percent in 1967, one year before the first generating units were installed at the Gordon M. Shrum Station (2415 MW total). Another peak was achieved in 1974, corresponding to the Kootenay Canal and Mica hydro projects. Since then, the region's share has remained fairly constant. The increase in 1981 followed from ongoing construction on the Revelstoke hydro project and on a transmission line from Vancouver Island to the mainland.

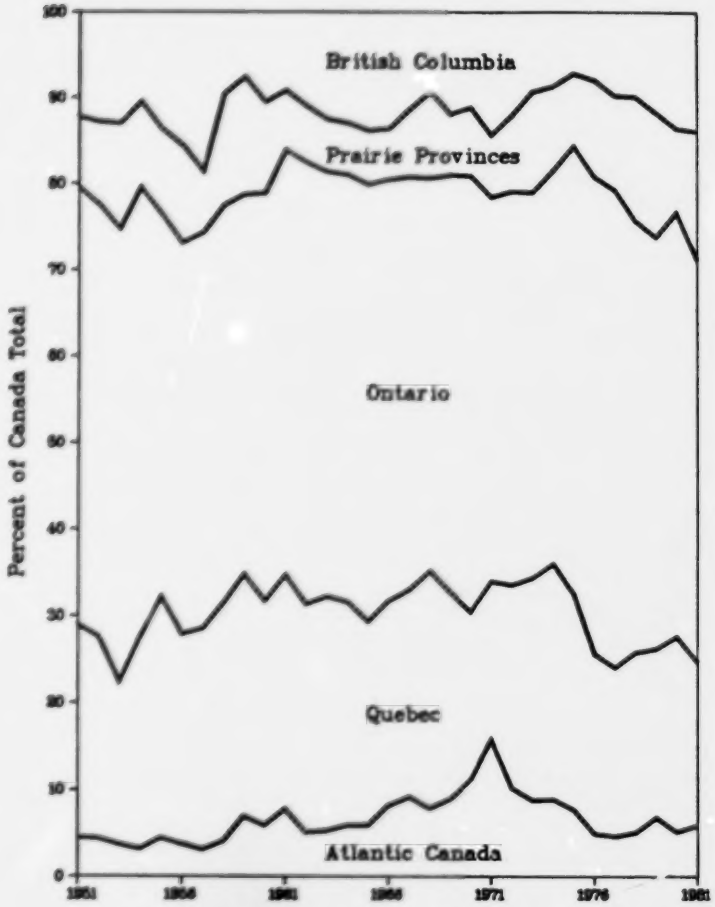
In the short term, it is not likely that the inter-regional distribution of utilities investment will change drastically from recent experience. Because of projects under construction or committed, Ontario and the western provinces will probably gain at the expense of Atlantic Canada and Quebec. Among those developments planned for the current decade are three nuclear stations in Ontario, coal-fired stations in Saskatchewan and Alberta, Saskatchewan's Nipawin hydro plant, and the Revelstoke hydro station in British Columbia.

In the longer term, a number of proposed generation projects could alter the regional investment shares. These include the Lower Churchill River project in Labrador, Fundy tidal power in Nova Scotia, a second nuclear station in New Brunswick, James Bay Phase II in Quebec, Manitoba's Limestone hydro project, the Slave River development in Alberta, and British Columbia's Peace Site C.

3.4 Manufacturing

Manufacturing investment has historically been a driving force in regional economic development. From the broad perspective, the 1950s and 1960s represented a period of growth for Canadian manufacturing. In the 1960s, new foreign markets were penetrated and the strategic U.S. market was strong. The 1970s, in contrast, brought growing foreign competition and rising energy prices which combined to make Canadian products less competitive abroad and at home.[2] Most recently, the world recession has resulted in soft markets for Canadian manufactured goods.

With a few exceptions, the regional shares of manufacturing investment remained relatively stable over the 1951-81 period (see Figure 3.5). Atlantic Canada's investment share demonstrated an increase through the 1950s and 1960s. Much of this increase is attributable to government assistance aimed at expanding the manufacturing base in the Atlantic provinces. The 1971 peak of 15.7 percent of national manufacturing investment reflects a number of major investments. Three important ones were construction of Newfoundland's Come-by-Chance oil refinery and Nova Scotia's Point Tupper refinery and expansion of the Irving oil refinery in New Brunswick. After 1971, Atlantic Canada's share



Source: Statistics Canada, Private and Public Investment in Canada, 61-206.

Figure 3.5: Manufacturing Investment

experienced a decline and generally held its own from 1976 on. The slight rallying in 1979 can be attributed to expansion and modernization in the region's main resource-based manufacturing industries, pulp and paper and fish processing.

Quebec has traditionally had the second largest share of Canadian manufacturing investment, averaging 23.8 percent between 1951 and 1981. Investment was fairly strong throughout the 1950s, and the province's share peaked at 27.9 percent in 1959. Major investors during the period were the aluminum and forest products industries. During the 1960s and particularly into the early 1970s, Quebec's share underwent a slight decline. This was due mainly to structural difficulties in its manufacturing sector. Specifically, Quebec manufacturing remained weighted towards its traditional resource-based and clothing and related industries which were characterized by low growth and low productivity. Ontario, in contrast, was developing a relatively high concentration of rapid growth durable industries (eg., iron and steel, transportation equipment, etc.). Quebec's investment share did make a resurgence in 1973 and 1974, in part because of economic activity generated by James Bay and other large engineering projects at that time. However, since 1976 the province's share has stayed fairly stable at almost 20 percent of the national total.

With its well-diversified industrial structure, Ontario has commanded approximately half of Canadian manufacturing investment in the last thirty years. While the province's investment level has reflected conditions in world markets, its regional share has generally fluctuated around the 50 percent mark, only changing significantly with developments in other regions. Examples are the 1971 investment peak in Atlantic Canada and the surge in manufacturing investment in the prairies which accompanied the oil boom after 1975. Both of these developments effectively reduced Ontario's investment share. To a certain extent the consistency of Ontario manufacturing investment can be attributed to its concentration of rapid growth industries such as the steel industry which has continually modernized in order to remain competitive. The 1976-77 peak of 55 percent of national manufacturing investment was largely a result of

modernization programs postponed during the 1974-75 economic slowdown.

In the prairie region, increases in manufacturing investment have tended to parallel activity in the oil and gas sector. This explains the expansion in the region's investment share during the 1950s and the late 1970s. One rapid growth industry in the late 1970s was petrochemical production in Alberta, which developed around the province's secure, plentiful supply of natural gas feedstock. Investment activity was strong in the latter half of the past decade, as Alberta entered the world market for petrochemicals. While most of the stimulus from oil and gas development was felt in Alberta, the other prairie provinces received spin-offs as well. Manitoba benefited from its role as a service liaison between east and west. Saskatchewan benefited from the extensive pipeline construction in the prairies, with the Interprovincial Steel and Pipe Company (IPSCO) being the largest manufacturing concern in the province.

British Columbia's share of Canadian manufacturing investment has been the most cyclical of the regional shares over the past three decades. This is due to the capital intensity of its principal industry, forest products. Peaks in the province's investment share data series--the mid-1950s, mid-1960s, early 1970s, and late 1970s--correspond to major expansions in the provincial pulp and paper industry.

The short-term prospects for manufacturing investment in Canada are not favourable in light of the current world recession. Regions with a dependence on resource-based, export-oriented industries such as forest products, primary metals and fish processing (e.g., the Atlantic provinces and Quebec) will likely continue to reflect the cyclical trends, of their major customers. The main prospects for increasing regional investment shares would appear to lie in manufacturing spin-offs from large resource developments. In particular, development of east coast offshore oil would stimulate shipbuilding and other manufacturing investment in Atlantic Canada. The interregional distribution could also be affected by major changes in industrial structure. For example, in recent years, the Quebec government has actively

been promoting a transfer of industrial activity into high growth, 'high technology' industries.

3.5 Primary, Construction, and Service Industries

Excluding the oil and gas industry, the primary sector exhibited a general decline over the 1951-81 period. Agriculture, forestry and the fishery were all characterized by rising mechanization and productivity and a declining contribution to employment. Mining generally increased throughout the 1950s and 1960s, as foreign markets were strong and substantial exploration activity took place. In the 1970s, this sector faced growing competition from third-world countries and, later in the decade, depressed world markets. Two exceptions to this trend were coal and uranium mining. Both industries experienced a stagnation during the 1960s and a subsequent revival after the OPEC oil price increases of 1973-74. The coal industries in Nova Scotia, Saskatchewan, Alberta and British Columbia expanded to meet new foreign markets and domestic demands for electric power generation. Uranium mining in Ontario and Saskatchewan grew even more dramatically, in order to serve world demand for uranium and domestic needs for the CANDU nuclear system.

Across most regions, the historical trend in housing construction has been similar. That is, housing investment increased rapidly during the 1950s as a result of the post-war baby boom and again in the early 1970s as the baby boom children began to form families. Housing starts peaked in the mid-1970s and then declined largely due to high mortgage rates. This decline was considerably delayed for Alberta, where residential construction was stimulated by the oil and gas boom of the late 1970s and the accompanying rapid growth in population. Generally speaking, differences in construction investment across regions have related to heavy or engineering construction. Examples of engineering projects which provided a major stimulus to provincial construction during the past decade are the James Bay hydro development in Quebec and the Syncrude oil sands plant in Alberta.

The services or tertiary sector demonstrated large gains between 1951 and 1981, in terms of both output and employment. The rapid growth in this sector, and most

particularly in the commercial services industry, was a function of rising income levels, increased urbanization and an initially small service base in some regions. Like other industries, growth in the services industries has been fostered by resource developments at various times. The recent oil and gas boom in Alberta greatly enhanced Calgary and Edmonton's roles as centres for wholesale and retail trade, and finance, insurance and real estate. Aside from stimulating investment in commercial services, such resource developments generate activity in other service-producing industries--railways, ports, shipping and communications.

Chapter 4

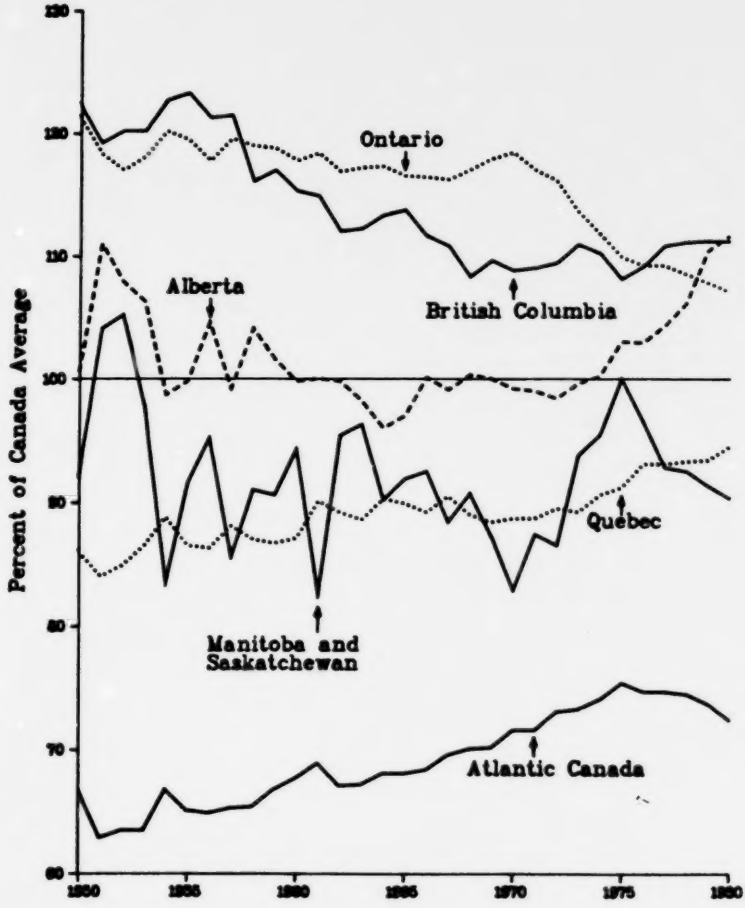
REGIONAL ECONOMIC DISPARITY

The pattern of investment is not the only factor which has shaped regional economic growth and accounted for the historical disparities across Canada. Regional disparities have also been influenced by differences in climate, resource endowments, proximity to markets, transportation facilities, labour quality and mobility, degree of urbanization, technological development, etc. This chapter provides a brief discussion of historical changes in regional disparities, with particular reference to: (1) income levels; (2) population flows; (3) industrial structure; and (4) policy measures aimed at reducing disparity.[3] No attempt has been made to treat the special considerations that apply to the development of Canada's northern territories, although it is obvious that investment in the north can have a major economic impact.

4.1 Income

While no precise measure of regional disparity has been formulated to date, per capita personal income (i.e., income accruing to individuals) is a commonly used indicator. It allows a comparison of productivity and economic welfare among different regions. The notion is that the closer the provincial average is to the national average, the smaller are interregional income disparities.

That there have been significant and persistent income disparities over the 1950 to 1980 period is clearly shown in Figure 4.1. Ontario and British Columbia have consistently demonstrated income levels above the national average. Alberta has been marginally above or below average for most of the last thirty years, while the other prairie provinces and Quebec have been below average. Income levels in the Atlantic provinces have shown the greatest divergence, ranging around thirty percentage points below the Canadian average.



Source: Based on data from Statistics Canada, National Income and Expenditure Accounts, 13-201.

Figure 4.1: Personal Income Per Capita

A steady, albeit slow, convergence towards the national average is apparent between 1950 and the early 1970s. British Columbia and Ontario approached the national average from above, whereas the eastern provinces made considerable gains due largely to increases in transfer payments (see below under section 4.4). However, the pattern of adjustment varied, with the relative decline in income in British Columbia outstripping the relative increase in Quebec and the Atlantic region.

The single most striking feature of Figure 4.1 is that regional income disparities have again been widening since the early 1970s. British Columbia, number two in the provincial rankings since 1959, overtook Ontario in 1978. Between 1976 and 1981, British Columbia moved from 8.1 to 11.2 percent above the national average. Alberta, whose per capita income had remained at the national average for the nine years ending 1975, rocketed to number one position by 1981 at 11.6 percent above the average. In the same period, the provinces of Atlantic Canada started a relative decline. The spread between the lowest and highest ranked provinces grew from 34.6 to 39.2 percentage points between 1976 and 1981.

There is no question that the new prominence of Alberta is a result of increased activity in the oil and gas industry. It is interesting to note, as well, that increased offshore activity on the east coast has not yet produced comparable gains. Much of Alberta's recent wealth is attributable to rising prices for existing production for which there is no associated cost. Economic activity, including investment, has flowed from these income gains. On the east coast, there has been no production to date, only exploration. After production commences, per capita income levels should rise. Many people hope that eastern hydrocarbon resources will propel Newfoundland and Nova Scotia from the ranks of the 'have-not' to the 'have' provinces.

4.2 Population

Another indicator of regional economic disparities is the flow of population between provinces or, alternatively,

migration trends. Neoclassical economic theory suggests that migration is not only a symptom of disparity but also a measure for reducing it. According to the theory, an efficient allocation of resources requires that factors of production such as labour move to where their returns are greatest. If there were not rigidities in the system, this would tend to equalize factor returns (e.g., wage rates) in different regions of the country.

Labour is relatively less mobile than capital. Thus, if a region is growing faster than the rest of the economy, it will first attract investment capital. Expansion, however, cannot continue solely on the basis of an infusion of capital; labour resources must be committed as well. Short-term fluctuations in economic activity will have effects on local unemployment rates, whereas long-term reallocations of resources, once recognized as permanent by the public, will cause people to migrate from other provinces.

There have been two major population trends in the post-war era. The first has been the migration from rural to urban areas. This was made possible by increased mechanization and specialization on ever-larger farms. The second trend has been the interprovincial migration from poorer regions to richer regions. By and large, the rich regions are industrial, so that much of the rural-urban migration has been manifested as a shift from Atlantic Canada and the prairie provinces to central Canada and British Columbia. There has also been a substantial movement to Alberta, particularly in the latter part of the 1970s.

Provincial growth rates of population are summarized in Table 4.1. In the 1950s and 1960s, the populations of British Columbia, Alberta and Ontario grew faster than the average. The Atlantic provinces, Manitoba and Saskatchewan grew at rates considerably below the average. Out-migration from the rural, agrarian regions to the industrial regions accounted for much of this differential. In Alberta's case, the oil boom drew large numbers of workers from the other prairie provinces. In Ontario, a contributing factor was that over 50 percent of foreign immigrants settled in that province. For example, in 1957 Ontario's population grew by 4.3 percent; 64 percent of this increase was a result of

immigration mainly from the aftermath of the Soviet invasion of Hungary.

TABLE 4.1

AVERAGE ANNUAL GROWTH RATES OF POPULATION
(in percent)

	1951-1961	1961-1971	1971-1981
Newfoundland	2.32	1.27	0.82
P.E.I	0.36	0.48	1.04
Nova Scotia	1.36	0.60	0.75
New Brunswick	1.46	0.53	1.03
Quebec	2.67	1.40	0.69
Ontario	3.11	2.17	1.16
Manitoba	1.65	0.60	0.44
Saskatchewan	0.97	0.16	0.65
Alberta	3.53	1.92	3.35
B.C.	3.61	3.14	2.15
Canada	2.69	1.71	1.24

SOURCE: Based on data from Statistics Canada, Canadian Statistical Review, 11-003.

In the 1970s, only Alberta and British Columbia maintained population growth rates above the national average. In Alberta's case, the growth rate was about triple the average. Part of this influx of people was due to an increasing share of foreign immigrants. The major reason, however, was a dramatic increase in migration from other provinces, especially from Ontario. In 1974, Ontario for the first time suffered a net outflow of people, many of whom were destined for Alberta. Alberta's net in-migration increased over 450 percent between 1973 and 1979.

The 1970s witnessed a general westward flow of population. People from the Atlantic provinces and Quebec moved to Ontario, people from Ontario, Manitoba and Saskatchewan to Alberta, and Albertans to British Columbia. This westward shift was largely a function of employment opportunities. Job creation in Alberta proceeded at twice the national rate--70 percent versus 35 percent between 1971 and 1981. The corresponding rate in the Atlantic provinces was 32 percent.

In spite of the out-migration from Newfoundland and the Maritimes the rate of unemployment there has remained high. This can be attributed to the influence of other factors such as the seasonality of employment in the Atlantic region and its particular vulnerability to swings in the business cycle. Even to the extent that migration has eased the labour imbalance, it may not provide a long-term solution to regional disparities; in fact, out-migration may compound the problem. It can be argued that rapid growth in one region (e.g., Alberta) tends to attract the younger and better educated and trained workers from slow growth regions (e.g., the Atlantic provinces). Capital is also drawn away, and the trend may be exacerbated by a tendency for other industry to locate in the high growth region. Ultimately, depending upon the magnitude of the population shift, the slow growth regions may find their economic base eroding as the human and physical capital required for an acceleration of growth is continually depleted.

4.3 Industrial Structure

The industrial structure or 'industrial mix' has an impact on a region's income and employment, and hence on the extent of economic disparity across regions. This impact results from the fact that certain industries demonstrate higher rates of productivity growth or greater stability, such that they provide a sustained stimulus to regional economic development. A region may be dependent on industries which are in decline or are subject to sharp swings in demand. In this case, diversification will be required in order to stimulate employment and to prevent the out-migration described above.

For all industrialized nations, the principal phenomenon in the changing industrial structure has been a gradual shift from primary industry--agriculture, forestry, fishing and mining--to secondary manufacturing and processing, and the tertiary (service) sector. In the early 1950s, the primary sector accounted for about 11 percent of Canadian Real Domestic Product (RDP) and 27 percent of employment. By the late 1970s, it was contributing approximately 7 percent of RDP and employment. (The decline would be even more startling if we were to exclude mining, an industry whose oil and

gas sector achieved large increases in value of production in the latter half of the 1970s). The corresponding growth in the service industries was equally dramatic. These industries include: transportation, storage and communication; wholesale and retail trade; finance, insurance and real estate; community, business and personal services; and public administration. Their share of total employment grew from less than 50 percent through most of the 1950s to about two-thirds by the end of the past decade. In contrast, manufacturing's share remained fairly constant from 1950 on, at between 22 and 24 percent of Canadian employment, although it did experience a slight decline in the 1970s.

While this basic shift from primary to secondary and tertiary industry has been common to all provinces, there is still diversity in industrial structure among the regions. For example, primary industry retained a substantial share of total employment in Saskatchewan and Prince Edward Island at the end of the 1970s, due to the continuing importance of agriculture in those provinces. The Atlantic provinces, as well, continue to be dependent on a limited number of primary products. This is a problem particularly in cases where a basic primary product goes through one or more processing stages. An example is the fishing and fish products industries which are concentrated, and employ a large number of workers, in the Atlantic region. Oriented towards export, these industries are highly subject to cyclical variation. Therefore, an economic downturn can have a pervasive effect on employment in the Atlantic economy.

The employment share of secondary industry remained highest in Ontario and Quebec, where most of Canada's manufacturing is located. However, in terms of evolving industrial structure, greater growth in manufacturing employment occurred in the Atlantic provinces, the prairie provinces and British Columbia than in central Canada. This was mostly a phenomenon of the 1970s. Alberta displayed the largest relative increase in manufacturing employment of any province--44 percent between 1971 and 1981.

The linking of interregional income disparities to differences in industrial structure is based on the premise that prosperous regions have a higher concentration of fast

growth industries. The decline in the primary sector was expected to reduce disparities by shifting employment from relatively low productivity, low income sectors such as agriculture into higher productivity sectors such as manufacturing. But this shift has had a fairly constant effect on average productivity and incomes across regions. Moreover, there is evidence of significant regional differences in productivity within particular industries. Income levels in the Atlantic region and Quebec are the result of relatively low productivity in most industries, rather than of a low concentration of high productivity industries.[4] In any event, regional economic disparities arise out of a combination of factors including differences in industrial structure, labour quality, per capita investment, and technological development.

4.4 Policy Measures

Since World War II, the federal government has been committed to fiscal transfers as a means of raising the standard of public services in poorer provinces. Between 1950 and 1980, total government transfers to persons increased from $1.0 billion to $30.3 billion per year. Table 4.2 shows for each of the provinces the change in proportion of personal income accounted for by government transfers to persons. In each case, the degree of dependency on federal compensation has risen, and by 1980 such transfers comprised 21 percent of income in the Atlantic region. Overall, the increase in government transfers to persons as a share of personal income has been less in the western provinces where real investment per capita has been above the national average.

Federal transfers to persons include veteran's pensions, unemployment insurance benefits, family allowances and other federal programs intended to improve individual standards of living. Provincial transfers include workmen's compensation benefits, direct relief, old age and blind pensions, and grants to post-secondary institutions. Important, as well, to the reduction of regional disparities are intergovernmental transfers, capital assistance and subsidies. Equalization and other unconditional transfers to provincial governments are designed to bring provincial per capita

revenues up to the national average. Conditional grants and shared cost programs for such purposes as road construction and assistance to the aged have been phased out in the wake of the 1977 Fiscal Arrangements Act. Among the other federal transfers are specific-purpose transfers (e.g., for health care), transfers to municipalities, DREE (Department of Regional Economic Expansion) programs, subsidies to business and agriculture, and the subsidy on imported oil.

TABLE 4.2

GOVERNMENT TRANSFERS TO PERSONS
AS A SHARE OF PERSONAL INCOME
(percent)

	1951-1960	1961-1970	1971-1980
Newfoundland	14.7	18.8	27.2
P.E.I.	15.4	17.7	22.0
Nova Scotia	11.1	12.6	16.8
New Brunswick	13.0	14.0	19.1
Quebec	8.7	9.6	14.5
Ontario	6.6	7.5	10.0
Manitoba	8.3	9.7	12.0
Saskatchewan	10.5	10.8	12.9
Alberta	8.2	9.4	10.5
B.C.	9.7	9.6	11.8
Canada	8.3	9.1	12.3

SOURCE: Based on data from Statistics Canada, National Income and Expenditure Accounts, 13-201.

The Department of Regional Economic Expansion was established in 1969 to coordinate regional development policy and the activities of institutions created to carry out that policy. It was the culmination of planning which began in the 1950s and saw the introduction of a number of federal programs such as ARDA (the Agricultural and Rural Development Act, 1961), the Atlantic Development Board (ADB, 1962), and the Area Development Agency (ADA, 1963). One major DREE program is the Regional Development Incentives Act (RDIA) which provides cash subsidies to industries that locate, expand or modernize in 'special areas' of the country where employment growth is deemed to be desirable. At the

end of the period under review there was a consolidation of federal government regional activities with a merging of the Department of Regional Economic Expansion with the Department of Industry, Trade and Commerce.

Clearly, the massive growth in fiscal transfers to provincial and municipal governments and to individual citizens has contributed to the reduction in regional income disparities over the last thirty years. However, this federal policy is often objected to on the grounds that it has created a financial dependency on the part of poorer provinces, as opposed to fostering sustained economic growth.

With respect to the success of the Regional Development Incentives Act, the reviews have been mixed. Location subsidies have been criticized for encouraging expenditures on capital over expenditures on labour, for displacing competitive industry with less efficient subsidized industry, and for financing industries to settle in areas where they would have settled even without assistance. It is very difficult to judge post facto whether these subsidies have had a significant impact on regional employment, and the evidence to date has been inconclusive. There is a general perception, however, that DREE and other federal programs have not sparked a process of self-sustaining economic growth in poorer provinces; nor have they been directed towards developing an industrial strategy or changing the basic industrial structure. For these reasons other policy measures have been suggested in order to reduce economic disparities among the provinces. These include manpower policies, regionally-oriented fiscal policies, and regional tax incentives. Also, under the new Canadian Oil and Gas Lands Act, there are requirements that a Canada benefits plan be submitted prior to the commencement of the work program under an exploration agreement and that there be a Canadian ownership rate of 50 percent or more before any oil or gas production commences.

The process by which economic disparities are narrowed is complex. Nevertheless, it is clear that problems are lessened when economic growth is fairly strong. When this occurs, and labour and capital resources are drawn on to support and extend the growth, policy measures can be of a

facilitating type. For example, with the strong growth of investment in Alberta in the 1970s, that province required a lower rate of increase in government transfers to persons as compared with the preceding decade than other provinces. Given government resources to create the basis infrastructure, growth is more likely to be sustained if impediments to investment opportunities are removed rather than by providing subsidies to foster investment. Governments are inevitably drawn in to support weak and declining industries.

In earlier chapters trends in regional investment have been chronicled, with particular attention paid to capital expenditures in the energy sector. In this chapter some of the implications for income disparities, population growth and industrial structure have been noted and some regional policy measures have been reviewed.

Chapter 5

CONCLUDING REMARKS

5.1 Summary

The discussion of previous chapters has shown the importance of investment, in particular energy investment, as a contributing factor to regional economic growth and diversification. Through the 1950s and 1960s, higher levels of per capita investment were partially responsible for the growth in per capita income experienced in Atlantic Canada. Likewise, the westward shift of capital spending during the 1970s contributed to higher incomes in western Canada.

Between 1950 and 1980, a number of major energy-related developments left their marks on the provincial and national economies--for example, the oil and gas booms in Alberta in the 1950s and 1970s, the interprovincial oil and gas pipelines in the 1950s, and the Churchill Falls and James Bay hydroelectric projects in the 1970s. While every Canadian province has felt the stimulus of energy investment at some point in its history, at least part of the economic disparity across regions can be explained by differences in resource endowments.

This is illustrated by the relative situations of Ontario and Alberta. Ontario is acknowledged to be an energy 'have-not', importing most of its fuel requirements. Alberta, on the other hand, is a net exporter of energy. The economic boom in the Albertan oil and gas sector during the 1970s has engendered much discussion of a westward shift in the Canadian economy. Furthermore, it has been suggested that this growth has been at the expense of central Canada.

The principal change over the last decade has been in the terms of trade between commodities exchanged within Canada. Energy prices increased dramatically relative to other prices. Given the respective positions of Ontario and Alberta with regard to net exports of energy, this has

resulted in a wealth transfer from east to west. Higher prices, in turn, have meant an increase in the rate of return on capital investment, leading to increased capital formation in the energy sector. Migration from other provinces has occurred as income generated from oil and gas production has filtered down, raising real wages in the west. Greater employment opportunities associated with the expansion of economic activity have also lured migrants.

The effect of these developments on the Ontario and Alberta economies has been documented elsewhere.[5] In Alberta, both the growth in the oil and gas industry and an increasing population base have fostered expansion in the construction industry, manufacturing, and the service sector. Import-substituting goods production has been enhanced by higher transport costs due to rising fuel prices. In addition to the growth in real wages and services, Alberta residents have benefited from relatively low energy prices and tax rates. Local governments, for their part, have experienced a substantial increase in revenues from which to fund government services and industrial development.

In contrast, Ontario residents and industry have felt the impact of rising prices on their oil and gas imports from the west. Considerable debate has centred on the effect of higher energy costs on the competitiveness of provincial manufacturing. Ontario's changing status within the country is highlighted by the recent controversy relating to the federal government equalization program. T. J. Courchene has shown how Alberta's ballooning oil and gas revenues since 1973-74 have given rise to massive federal transfers to the energy have-not provinces.[6] Although Ontario's situation with respect to energy has qualified it as a have-not for the last four years, it has been prohibited from receiving equalization payments; at the same time, the province bears the largest share of equalization funding through its contribution to federal income taxes.

Table 5.1 provides some illustrative statistics on the change in relative economic strength between Ontario and Alberta during the past decade. The years 1972 and 1980 were chosen to reflect periods before and after the increase in the relative price of energy. It is apparent that Alberta's

position has improved relative to that of Ontario. In spite of this it would be erroneous, of course, to attribute Ontario's decline solely to the resurgence of Alberta. External factors such as the slowdown in world economic growth and increasing foreign competition have contributed to the weakening of the Ontario economy. Indeed, for the most part, Alberta and Ontario industry are complementary to the extent that oil-and-gas-related development in the west stimulates manufacturing in central Canada. Moreover, because of the presence of energy wealth in Alberta, Canada has not suffered as much as many other industrialized nations in adjusting to higher oil prices. The freedom to migrate allows citizens of all provinces to participate in the wealth and employment opportunities generated in western Canada.

TABLE 5.1

ECONOMIC COMPARISON: ONTARIO AND ALBERTA

	1972		1980	
	Ontario	Alberta	Ontario	Alberta
Real investment per capita (1971$)	1,006	1,368	977	2,866
Unemployment rate (%)	5.0	5.6	6.9	3.7
Share of Canadian jobs created (%)	56.3	12.5	22.4	21.7
Share of population (%)	35.8	7.6	35.6	8.9
Per capita personal income ($)	4,459	3,782	10,614	11,067

5.2 Characteristics of Major Energy Developments

It is important to recall that the main purpose of investment in the energy and other sectors is to create future productive capacity in the economy. It is critical

that this process occur in a manner that keeps costs to a minimum. In addition, investment plays another significant role; it generates income and employment as construction and other activity proceed.

It is the nature of energy projects that they involve substantial investments. For this reason, energy investment can exert a strong and quickly felt influence on a regional economy. Provincial governments have long been aware of the usefulness of energy developments in creating investment and employment opportunities in their jurisdictions. This has been the case particularly in electric power development which, because of its degree of public ownership, has been more amenable to provincial control. Historically, for provinces such as Ontario, Quebec and British Columbia, investment in hydroelectric power was instrumental in attracting primary metals and forest products industries. More recently, governments have been concerned with the job-creation aspect of electric power projects. For example, the Churchill Falls, Nelson River and James Bay projects all provided much needed employment in their respective provinces during the 1970s.

As well as furthering the goals of energy self-sufficiency and security of supply, major energy developments can give rise to a number of economic benefits: jobs in engineering, construction, administration and operations; stimulus to the manufacturing and service sectors; expansion of the industrial base; development of skilled labour and high technology; and provision of infrastructure. Because of the general capital intensity of energy projects, labour input can vary from less than 2 percent to about 40 percent of total cost in the construction or development phase. The lower end of this range corresponds to conventional oil and gas development, while the upper value represents electric power and some refinery projects. (It should be noted that these estimates do not take account of the labour which goes into the materials and equipment component of total cost.) The development phase of a project may only last a few years. Although oil sands, heavy oil and pipeline projects employ more labour in their construction phases, investment in oil and gas exploration typically occurs over a longer period of time, and hence may provide continuing spin-offs to ancillary

industry. During the operating phase, most energy developments entail minimal employment. One exception is a large scale oil sands project, which may require in excess of 5600 operating employees.

Aside from variation in the quantity of labour employed, there are qualitative labour differences across energy investment projects. For example, exploration for hydrocarbons demands a relatively high proportion of skilled workers. Major energy developments--in particular those involving new technology such as offshore and frontier oil and gas exploration--may place excessive strain on local economies to supply skilled labour, especially in the case of comparatively slow growth regions. However, these projects also provide the opportunity to develop skills according to a 'learning by doing' approach. Moreover, they may create an economic base from which to formulate labour force training programs.

Large scale energy investment can also foster development in the input-supplying and service sectors. Particularly important for spin-offs to manufacturing industry is the extent of Canadian content at each supply linkage. The Canadian content of most energy projects is quite high, in the 80 to 90 percent range. The majority of import purchases relate to either very large or highly specialized machinery and equipment. Examples include heavy construction equipment and large thermal turbine generators. Manufacturers in Ontario and Quebec are major suppliers for pipeline construction, electric power projects, and hydrocarbon exploration and development. The CANDU nuclear power industry demonstrates a Canadian content level of about 90 percent, bringing together domestic uranium resources, Atomic Energy of Canada Ltd. technology and engineering, Ontario manufacturing, and provincial electric utility and construction industries.

In addition to these potential benefits, there may be problems associated with major energy projects. Because of economies of scale and the intrinsic nature of much of resource development, investment spending tends to be 'lumpy'. If marginal increases in productive capacity are inefficient, capacity is generally overinstalled at the early stages of

production. This can lead to periods of low utilization. Thus, if a particular development is of sufficient size, it may cause an overheating of the economy followed by a slackening of investment demand. Such a process can often be highly destabilizing.

A similar sort of consideration applies to employment opportunities. It is often argued that large investment projects, or 'megaprojects', are only a temporary solution to local unemployment and that they create considerable economic dislocation. In many cases, workers are drawn to the development site during the construction phase, after which employment opportunities are dissipated. Hydro-Quebec is currently facing just such a problem as construction winds down on its James Bay Phase I development. The dislocation of labour is usually classified as one of the 'social costs' of megaprojects. Others include damage to the ecological environment and disruption of traditional native lifestyles.

A final problem relates to the inflationary and structural impact associated with rapid pursuit of energy projects in resource-dependent regions with small local markets and limited economic infrastructure. Atlantic Canada, in particular, has been plagued by cyclical downturns in demand for its export-oriented primary products (e.g., fishing and forestry). These downturns have contributed substantially to the region's unemployment and accompanying out-migration. It is conceivable that similar difficulties could confront development of Hibernia oil or of the natural gas off Nova Scotia, both of which would have to serve not only local but also external markets.

In spite of these potential problems, major energy developments offer a host of opportunities to regional economies--to develop skilled labour and expertise, to participate in high technology, to expand the industrial base, etc. These are the types of benefits sought under the Canada Oil and Gas Lands Administration agreements. A large hydrocarbon development off the east coast for example, could generate substantial spin-offs in the local construction, steel, refining, petrochemical, shipbuilding, transportation and service industries. The principal advantage of such large scale projects is that they show the potential to initiate

the self-sustaining economic growth so desperately needed in Canada's slower growth regions.

5.3 Opportunities

The year 1982 witnessed a spate of cancelled or postponed major projects, primarily in the energy field: the Alsands and Cold Lake oil sands plants, the Alaska highway natural gas pipeline, a heavy oil upgrader in Montreal, Petrosar's hydrocracking facility at Sarnia, the western power grid, and the Hat Creek coal-fired power project in British Columbia. These have been the major casualties, most attributable to the worsening world recession. Additionally, in the case of some projects, it has become clear that they were not the least cost means of meeting energy requirements. Whatever the reason for cancellation or postponement, the effects have been to exacerbate the current economic slowdown and increase unemployment.

Nevertheless, many long-term investment opportunities remain throughout the country. A number of these opportunities are promising given domestic and foreign energy requirements by the end of the century. In Newfoundland there is Hibernia oil, natural gas on the Labrador Shelf and hydroelectric development on the Lower Churchill River. Prince Edward Island is exploring conservation and alternative energy sources such as wind power and biomass. Nova Scotia has offshore natural gas, Cape Breton coal and Fundy tidal power. The major prospect for energy investment in New Brunswick is further development of CANDU nuclear power. In Quebec, considerable hydro potential remains after James Bay Phase I, and a natural gas trunkline extension is under construction to carry natural gas to Quebec City. Ontario has energy potential mainly in uranium mining and further CANDU power development. Manitoba is blessed with massive untapped hydro resources. In Saskatchewan, new uranium production is opening up and the province also has endowments of heavy oil. There continues to be a variety of investment opportunities for energy-rich Alberta: conventional oil and gas, oil sands, heavy oil, enhanced recovery, refining, petrochemicals, and coal. British Columbia's prospects lie in northern hydro development, coal and natural gas. In

northern Canada there is oil and gas development and related transportation projects.

This cursory listing indicates the wide range of energy investment opportunities in all regions of Canada. Several potential developments (e.g., offshore oil, nuclear power) raise issues of political and public controversy and of Canada's ability to perform in high technology industry. Assuming that these and other challenges can be met, major energy developments can provide a significant stimulus to regional economic growth in Canada. As Canada emerges from the depths of a severe recession, with inflation and interest rates down from their recent peaks, opportunities for investment are beginning to arise. Exploration activity off Nova Scotia is increasing rapidly, with $2 billion committed over the period to mid-decade. In the prairie provinces there is renewed activity in the search for and recovery of oil, including recovery processes for heavy oil. Other regional opportunities will be created as the Canadian and world economies recover.

Footnotes

[1]Throughout this study, growth rates are estimated by means of a restricted least squares logarithmic regression.

[2]It has been argued that domestic energy prices should have increased the competitiveness of Canadian manufacturing, since other countries moved towards world oil prices much more rapidly than Canada. However, it should be pointed out that lower domestic prices have led to the installation of less energy-efficient machinery and equipment, ultimately reducing Canada's competitive edge.

[3]The Economic Council of Canada, in its 1977 report entitled Living Together: A Study of Regional Disparities, emphasized the explanation of income and unemployment disparities and treated population growth rates mainly as a consequence of these disparities. It examined the various issues considered here in greater detail. The extension of the time period to 1981, however, is very pertinent because the trend of declining income disparity has since been reversed.

[4]The Economic Council, op. cit., page 96, concluded that most of the differences in labour productivity between the provinces and the Canadian average were not attributable to industrial structure but rather to the lower or higher levels of output per worker in each industry.

[5]See for example Ontario Economic Council, Energy Policies for the 1980s: An Economic Analysis, 2 volumes (Toronto: Ontario Economic Council, 1980) and "The Alberta Heritage Savings Trust Fund: An Overview of the Issues," Canadian Public Policy, 4 Supplement (February 1980).

[6]T. J. Courchene, "Energy and Equalization," Energy Policy for the 1980s, supra note 5 at pp. 103-131.

Appendix A

TRENDS IN PROVINCIAL INVESTMENT

The general provincial patterns of investment have been outlined in Chapter 3. In this appendix, the development of each of the provincial economies over the past three decades is examined. Attention is given to their different strengths. Within this context, the particular role and significance of energy investment has been considered. In some provinces, such as Quebec and Alberta, energy investment has been especially important. In others, such as Ontario, energy has provided a less direct stimulus. In that province, however, the effects of pipelines, refineries, petrochemical plants, electrical generating facilities, and other energy related investments have been significant.

A.1 Newfoundland

Newfoundland's economy is oriented towards resource-based industries. Fishing, pulp and paper, and mining have historically been major contributors to provincial output and employment. Most investment has been directed towards these and other capital intensive sectors such as electric power, and has been undertaken by private industry, utilities and government.

The bias towards the resource sector is evident in Table A.1, which shows the growth in total per capita real investment and its distribution by sector. Total per capita investment increased steadily in real terms throughout the 1950s and 1960s at average annual rates of 3.9 percent and 5.9 percent, respectively, and subsequently declined in the 1970s at an average rate of 4.4 percent per year. Between 1966 and 1973, per capita investment equalled or exceeded the national average, largely due to developments in the electric power industry. Generally speaking, a greater proportion of investment has been allocated to the primary industries, government and utilities sectors relative to the rest of Canada.

TABLE A.1

INVESTMENT IN NEWFOUNDLAND

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities (% of total)	Services	Govern-ments	Housing
1951	287	21.0	11.6	11.8	3.1	3.3	25.6	23.6
1952	354	15.9	16.0	10.1	6.0	9.4	19.2	23.3
1953	310	9.7	15.2	10.6	4.4	10.9	21.7	27.5
1954	295	11.7	10.6	5.2	5.4	8.9	29.1	29.1
1955	331	14.8	10.1	7.0	6.1	8.1	26.8	27.0
1956	355	16.2	9.5	8.6	5.8	7.9	21.5	30.5
1957	349	13.5	12.6	13.4	6.2	8.5	18.7	27.1
1958	360	6.5	5.4	13.0	8.9	7.4	33.5	25.5
1959	373	8.3	7.8	17.0	5.5	8.1	28.5	24.8
1960	474	17.3	8.1	7.9	9.4	5.4	23.1	28.8
1961	587	33.9	10.4	3.8	9.8	5.1	15.7	21.3
1962	781	50.7	8.4	2.9	7.6	3.6	11.3	15.5
1963	666	39.8	5.4	3.3	8.5	4.5	17.1	22.0
1964	626	35.1	5.7	5.5	2.6	5.7	26.0	19.4
1965	578	19.3	5.6	5.6	11.4	7.6	29.0	21.5
1966	817	21.5	10.2	3.2	16.9	9.4	20.2	18.7
1967	818	20.3	13.9	5.1	18.8	6.2	19.3	16.2
1968	880	10.2	13.2	4.3	32.4	3.3	17.0	19.6
1969	846	8.0	6.0	6.6	44.9	5.3	12.6	16.6
1970	1022	10.0	8.9	3.8	47.6	4.3	12.5	12.9
1971	1298	18.0	20.7	2.3	27.2	3.9	12.7	15.2
1972	1099	21.0	14.8	3.5	22.4	3.6	14.8	19.8
1973	1033	19.8	9.5	6.6	16.2	5.9	13.9	28.2
1974	952	14.1	8.9	7.4	11.1	8.6	16.7	33.2
1975	847	13.9	5.1	7.0	10.7	9.5	22.5	31.3
1976	879	9.9	4.9	5.3	19.2	8.3	17.5	34.8
1977	707	11.0	5.8	7.9	10.0	13.7	21.2	30.3
1978	734	13.7	5.6	4.9	12.0	15.5	25.0	23.3
1979	873	22.1	9.3	5.8	10.3	11.4	20.4	20.7
1980	820	20.4	11.8	6.4	10.1	9.2	17.3	24.8

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

Newfoundland was essentially built on the fishery. In the immediate post-war period, this sector experienced a spurt of activity as production shifted from the declining salt cod industry to the processing of fresh fish for export. This led to substantial investment in the offshore fishery and fish processing plants. With regard to output and employment, the 1950s and 1960s witnessed a rapid expansion in foreign fishing effort off the Newfoundland and Labrador coast. By 1969, the contribution of fishing to Real Domestic Product had levelled off, and it underwent a decline through 1975. Overexploitation culminated in a serious depletion of fishing stocks, in particular the herring stock. Since that time, however, the declaration of the 200-mile limit has improved stocks. The fishing sector was beginning to recover, in part as a result of higher prices, but has encountered renewed difficulties in recent years.

The pulp and paper industry has accounted for a substantial portion of value added in Newfoundland. Production has been centralized in two mills at Corner Brook and Grand Falls, both built at the beginning of the century. While Real Domestic Product in the forestry sector increased moderately at an average annual rate of 7.2 percent throughout the 1960s, value added and employment experienced a relative decline. A linerboard mill was established at Stephenville in the early 1970s, and production subsequently peaked in 1974. However, the new mill sustained losses and was shut down in 1977 for conversion to newsprint facilities. While there was increased activity in the forestry and pulp and paper industries in the late 1970s, the world recession has since caused a slowdown.

Mining grew substantially during the 1960s, more than doubling in terms of real output. The post-war period saw a shift in mining activity from the Island to Labrador with its major iron ore deposits. Between 1960 and 1963, the Iron Ore Company of Canada's developed the Knob Lake deposits and the asociated concentrator and pelletizing plant in Labrador City. There was a doubling of pelletizing capacity in the period 1965-67 and again in 1970-73. By the early 1980s activity had slowed as the recession reduced steel demand.

There were surges of investment in the primary sector associated with the activities outlined above. The recent increase in mining investment is attributable to offshore drilling for hydrocarbons. Exploration began on the Grand Banks in 1964 and, by the end of 1976, 54 wells had been drilled off the coast of Newfoundland and Labrador. Drilling was halted in 1977 as a result of a jurisdictional dispute involving the province, Ottawa and the industry. The dispute centred on the introduction of provincial regulations aimed at maximizing employment and income within Newfoundland. Activity resumed in 1978, and in the following year approximately $180 million of the total $227 million spent on east coast offshore drilling was directed to the Newfoundland and Labrador coast. With the help of federal tax incentives and the participation of Petro-Canada in exploration, the first commercially viable oil well was discovered at Hibernia in September 1979. Assuming that technological and jurisdictional obstacles can be removed, development of Hibernia could begin as early as 1983, with production commencing in the latter half of the decade. On the other hand, natural gas from the Labrador Shelf could not be brought on stream until the mid-1990s at the earliest. Gas development faces major technical difficulties relating to icebergs and methods of economically bringing the gas to shore.

Since the mid-1960s, Newfoundland's utilities have been major investors in the province. The first phase of the Baie d'Espoir hydroelectric project was completed in 1967, with the second phase ending in 1970. The huge Churchill Falls development was begun by the British Newfoundland Corporation (BRINCO) in late 1967. A total of eleven 475-megawatt (MW) units came on stream between 1971 and 1974. At the height of construction activity (1969-70), utility investment constituted half of total investment in Newfoundland. After Churchill Falls, capital expenditures slackened off. Minor additions were made to existing plants and construction was started on small hydro projects at the Hinds Lake and Upper Salmon sites. This falling off of investment would not have occurred had Newfoundland proceeded with immediate development of the Lower Churchill River Basin (2300 MW in total at the Gull Island and Muskrat Falls sites). It has not yet been possible to make arrangements for transmission of the power from these sites to markets.

Manufacturing investment has generally declined in importance since the 1950s. In the 1960s, the Newfoundland government provided subsidies for a number of major industrial projects aimed at diversifying the economy. Among these were the Marystown Shipyard and the oil refinery at Come-by-Chance. The construction of the Come-by-Chance refinery is reflected in the data on manufacturing investment for 1971. Its subsequent bankruptcy five years later resulted in a decline in manufacturing production. Newfoundland's only existing refinery at Holyrood was built in 1961 and underwent several expansions in the late 1960s and early 1970s to reach its current capacity of 14,000 barrels per day. In general, attempts at industrial diversification have been unsuccessful, and most of the growth in manufacturing investment has been associated with resource-based industries.

Of the other sectors, governments have historically accounted for a substantial share of total investment in Newfoundland due to their role in promoting economic development and in providing infrastructure. The 1960s witnessed a rapid expansion in the service, housing and construction sectors. This resulted from increased urbanization, an initially small service base, and activity generated by large scale engineering projects such as Churchill Falls. In the future, similar spin-offs could occur from offshore oil and Lower Churchill hydro.

A.2 Prince Edward Island

Like Newfoundland, Prince Edward Island is highly dependent on its few natural resources. Agriculture, in particular potato production, plays a dominant role in the provincial economy. Other industries include hog production, dairy products, fishing, and fish and food processing. Total real per capita investment increased at an average rate of 8.7 per cent per year over the 1950s, well above the national average, and then declined slightly throughout the 1960s. In the 1970s, per capita investment grew at 1.3 percent per year, compared to 2.6 percent for Canada as a whole (see Table A.2).

TABLE A.2

INVESTMENT IN PRINCE EDWARD ISLAND

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	271	28.5	1.3	4.7	4.2	4.9	36.2	20.3
1952	270	35.3	4.6	12.9	2.8	6.0	32.8	5.6
1953	268	29.7	3.8	8.9	2.2	8.2	31.9	15.3
1954	283	25.7	0.8	5.8	4.4	13.8	29.6	19.8
1955	328	27.5	1.5	5.6	2.3	16.2	30.9	15.9
1956	355	22.6	0.8	11.9	7.8	7.4	35.8	13.6
1957	310	22.7	0.9	15.0	0.9	7.3	41.8	11.4
1958	426	23.1	1.0	18.8	2.0	6.3	34.0	14.9
1959	512	16.0	1.1	8.1	1.9	11.1	39.9	21.7
1960	507	20.2	1.6	2.7	7.7	10.4	37.0	20.5
1961	516	18.1	4.9	7.5	4.4	11.4	27.4	26.4
1962	552	15.3	1.2	6.1	5.9	9.0	27.4	35.1
1963	530	15.4	1.9	6.9	6.9	15.9	23.7	29.4
1964	474	22.4	3.6	5.3	3.6	15.8	30.5	18.8
1965	642	18.8	2.6	3.0	2.1	9.0	46.6	17.9
1966	620	20.1	2.8	4.1	2.5	5.3	42.8	22.4
1967	483	23.0	3.7	4.8	8.5	7.2	25.0	27.6
1968	411	21.5	4.5	6.0	8.5	8.3	23.3	27.8
1969	433	19.0	3.4	4.7	5.2	11.5	26.9	29.3
1970	515	22.3	2.4	4.6	2.6	4.8	31.2	32.0
1971	653	10.6	3.4	4.8	4.5	4.0	28.9	43.8
1972	611	14.9	1.9	5.5	4.6	5.4	20.4	47.4
1973	925	10.0	2.5	4.5	4.1	12.2	16.1	50.6
1974	751	13.2	3.8	7.1	2.0	12.2	11.0	50.7
1975	656	16.9	2.5	7.1	3.3	8.1	20.0	42.0
1976	566	20.8	4.3	7.2	6.0	7.4	15.3	39.0
1977	607	18.2	8.5	7.7	3.6	10.4	17.8	33.7
1978	717	15.4	2.5	5.9	2.4	13.1	20.0	40.6
1979	757	18.9	2.0	6.0	1.6	11.4	16.9	43.1
1980	734	20.9	1.8	15.0	4.2	8.8	20.1	29.3

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

The post-war trend in agriculture has been towards increasingly mechanized production techniques and specialization. Farm size has grown and greater productivity has resulted in a declining farm population. The potato crop has experienced wide fluctuations in price from year to year, creating instability in the P.E.I. economy. This instability has been offset in part by a rise in potato processing.

The provincial fishery is dominated by lobster, but also includes significant amounts of ground fish. Real Domestic Product in the fishing industry increased at an average annual rate of 1.9 percent during the 1960s. Production then dropped off in the first half of the 1970s but recovered somewhat in the latter half of the decade. Recently, there have been increased lobster landings.

There has been some oil and gas exploration off the eastern end of the island and in Northumberland Strait, but no commercial quantities have been discovered to date. Hudson's Bay Oil and Gas discovered natural gas in a wildcat well off East Point in 1974. A step-out well was drilled in 1980 and discovered to be dry. The company has continued drilling at another site, Beaton Point. Also in 1980, Chevron Standard and Irving Oil were granted permits to explore in the area.

In the P.E.I. economy, historically, governments have been major investors. During the 1960s, just under half of all non-residential investment was undertaken by the public sector. Through the 1970s, public investment declined in real terms at an average annual rate of 1.9 percent. A number of federally funded programs have attempted to stimulate self-sustaining growth in the province. These include the Fund for Rural Development Act (FRED, 1966-69) and the Comprehensive Development Plan (1969-84). The latter is geared towards development in the agricultural, fishing, manufacturing, forestry and tourism sectors.

Housing investment has also been significant. It peaked in 1973-74 and declined in real terms at an average rate of 9.2 percent per annum through 1980, as compared to 0.5 percent per annum for all of Canada. In terms of its contribution to Real Domestic Product, the service sector

grew constantly over the entire historical period. Tourism, an important industry to the island, fell off in the late 1970s due to higher gasoline prices; however, the devaluation of the Canadian dollar should lead to some recovery. In addition, the transfer of the department of Veteran Affairs to Charlottetown in 1981 should generate considerable investment in the construction and service sectors.

There has not been as sharp an increase in electricity investment in recent years as in some other provinces. The province's electric utility, Maritime Electric Company Ltd., has relied primarily on oil-fired steam generators for its domestic generation. Two undersea cables linked the utility with the New Brunswick Electric Power Commission in 1977, and by the end of 1980 New Brunswick was supplying three-quarters of P.E.I.'s electrical energy needs. Prospects for future electricity investment include wind-powered and wood-fueled generators and a co-generation project based on the burning of waste materials. These and other conservation and renewable energy projects have been under study by Maritime Electric and the P.E.I. government, with federal funding assistance.

A.3 Nova Scotia

In the early post-war years, Nova Scotia's economy was largely based on its resource industries and port facilities. Steps were taken in the 1960s to broaden economic activity, with the result that the province now has a diversified industrial base relative to the rest of Atlantic Canada. The majority of manufacturing is resource-based, leading industries being fish and food processing, pulp and paper, sawmills and petroleum refining.

Total per capita real investment increased at an average annual rate of 3.7 percent through the 1950s, above the national average but below the average for Atlantic Canada (see Table A.3). Between 1960 and 1970, per capita investment grew at an average 8.1 percent per year, the highest provincial rate for that period. This was due to the flurry of investment activity in manufacturing. During the 1970s, per capita investment declined in real terms at a rate second only to Newfoundland's.

TABLE A.1

INVESTMENT IN NOVA SCOTIA

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	322	15.5	7.9	10.3	7.3	13.6	18.6	26.9
1952	330	16.3	10.7	9.8	6.9	6.8	23.8	25.8
1953	368	12.5	7.5	12.6	6.3	9.1	27.4	24.6
1954	358	12.7	5.6	10.9	7.3	11.2	27.0	25.3
1955	368	12.9	12.6	13.8	7.2	8.8	17.9	26.8
1956	403	13.0	13.1	13.3	6.4	6.4	21.8	25.8
1957	392	11.1	9.1	14.5	6.6	6.9	22.6	29.2
1958	376	11.4	6.6	14.5	7.1	7.5	24.2	28.7
1959	451	8.8	6.5	11.3	7.3	9.7	24.7	31.6
1960	461	9.9	11.3	8.4	5.5	10.5	20.3	34.2
1961	432	9.6	18.0	7.5	4.1	10.0	17.6	33.3
1962	415	12.6	8.7	9.0	4.0	11.7	19.3	34.7
1963	417	10.1	14.1	9.8	5.6	12.5	16.8	31.1
1964	464	14.7	14.8	8.2	6.6	14.9	16.2	24.7
1965	521	9.2	19.0	7.4	7.5	9.9	21.3	25.6
1966	637	6.8	27.0	8.5	5.3	7.1	22.9	22.4
1967	698	8.5	27.3	8.5	6.0	9.0	19.3	21.5
1968	689	10.8	19.0	8.1	8.1	7.9	18.8	27.3
1969	786	9.2	20.1	7.8	9.0	8.7	16.1	29.9
1970	825	12.9	28.1	8.4	5.3	7.5	13.2	24.5
1971	795	10.1	30.2	5.9	6.1	7.2	16.1	24.4
1972	737	14.0	20.5	7.1	8.8	11.0	15.9	22.8
1973	903	16.1	22.5	7.3	5.6	12.5	15.0	21.1
1974	824	10.6	20.3	9.1	6.1	12.8	16.5	24.6
1975	741	10.6	13.8	9.8	10.2	10.8	15.9	29.0
1976	757	13.9	8.0	8.2	10.7	12.1	14.0	33.2
1977	699	10.4	10.6	7.0	14.7	13.1	16.4	27.7
1978	737	14.1	10.2	7.3	12.0	11.2	18.0	27.1
1979	738	17.1	12.5	8.4	8.5	11.8	17.1	24.7
1980	740	24.6	12.0	8.3	4.6	14.5	15.2	20.7

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

The building up of manufacturing capability in the late 1960s and early 1970s included the construction of two plants by the Michelin Tire Corporation, modernization of the Sydney Steel operations, and heavy water plant construction at Port Hawkesbury on Cape Breton Island. These and recent developments in pulp and paper, fish and food processing, petroleum refining, and electronics expanded the role of manufacturing in Nova Scotia's economy.

The province has been involved in petroleum refining since 1956, accounting for three of five Atlantic refineries and 41 percent of rated capacity at the end of 1980. A new plant at Point Tupper on the Strait of Canso doubled provincial refining capacity in 1971. In 1982, this plant was mothballed.

Real Domestic Product in manufacturing rose at an average rate of 5.5 percent per year between 1961 and 1970, and an average 3.9 percent per year between 1971 and 1980. Manufacturing as a whole accounts for a substantial portion of value added, but because of the capital intensity of resource-based industries it contributes relatively less to provincial employment. This is not the case for Michelin, however, which is the second largest employer in the province.

Agriculture has undergone a major transformation in the last three decades. An increased average farm size and greater mechanization have raised productivity, thus releasing agricultural workers to other sectors. The changes were especially rapid over the 1951-71 period with agricultural employment declining from 18.0 to 3.4 percent of the work force.

The fishery in Nova Scotia has exhibited a similar trend to the rest of Atlantic Canada, with the growth of the 1950s and 1960s giving way to the depleted herring and groundfish stocks of the 1970s.

The general historical trend in forestry has been a shift from sawmills associated with the shipbuilding industry to pulp and paper. Between 1965 and 1974, pulpwood production grew 150 percent. Although this industry has accounted

for a significant share of capital investment, its contribution to employment growth has been substantially less. Despite productivity gains in the 1960s, forestry has suffered from poor management and, most recently, the spruce budworm infestation. Nevertheless, favourable market conditions for newsprint stimulated production in the late 1970s. Up until 1982, the local lumber industry benefited from relatively high levels of demand in Western Europe.

The importance of mining to the Nova Scotia economy declined during the 1960s. Real Domestic Product in mining fell at an average annual rate of 4.2 percent from 1961 to 1970. This was due to the effect of high production costs on markets for Cape Breton coal. In 1973, coal made up only 25 percent of the value of provincial mineral production, as compared to its 73 percent share in 1965. However, since OPEC began raising the relative price of oil in 1973-74, prices of alternative energy sources have followed, revitalizing the Cape Breton coal industry. Between 1973 and 1978 production increased by almost 150 percent, such that in 1978 57 percent of the value of mineral production was attributable to coal. By 1982, production had risen to about 3 million tonnes, about half of which was destined for electrical generating plants in the province and the other half for metallurgical and other thermal coal markets, mostly abroad.

Recently, there has been diversification in the mining sector, with exploration and production occurring in lead, zinc, potash, iron ore, copper and uranium. Oil and gas exploration on the Scotian shelf has been going on since 1967 when Mobil Oil Canada Ltd. drilled its first well on Sable Island. Two commercial discoveries were subsequently made, Thebaud in 1972 and Venture in 1979. The latter discovery pushed Nova Scotian gas reserves over the economic threshold, but production is not anticipated until the late 1980s after technical problems have been solved and markets for the gas found. This development would have considerable implications for other sectors of the economy such as manufacturing, construction and the service industries. Shipbuilding, until recently a declining industry, has diversified to include the production of oil rigs and drilling equipment. The Sedco 709 rig, for example, was built in

Halifax. The potential for offshore oil production in Nova Scotia does not appear as promising as for gas.

The production of electric power has been highly dependent on imported oil. By 1981-82, the distribution of electric energy production by generation type had shifted to 36.8 percent oil, 41.2 percent coal and 12.0 percent hydro, with a further shift to coal planned. Most of Nova Scotia's hydro resources were developed before 1955. Utility investment during the 1960s and 1970s was channelled into steam-fired generating plants at Tuft's Cove (oil), Point Tupper (oil), Trenton (coal) and Lingan (coal). One major hydro project, Wreck Cove, was completed in 1977.

In keeping with both federal and provincial energy policy, the Nova Scotia Power Corporation is pursuing an off-oil program which will entail a number of large investments for the 1980s. The utility is planning to install two more generating units at its Lingan coal-fired station by 1984, as well as to convert some of its existing oil-fired plants to coal. These projects should provide a significant stimulus to the Cape Breton coal industry. The Cape Breton Development Corporation has an ambitious program of coal mine development planned, including the proposed new Donkin mine. In addition, the 1980s may see some full scale develoment of Bay of Fundy tidal power. A small pilot project was begun at Annapolis Royal in 1980, and the provincial task force on tidal power recently confirmed the financial and economic feasibility of a larger Cumberland plant for the 1990s.

The investment pattern arising from the diversification of Nova Scotia's economy is shown in Table A.3. The most striking feature of the data is the surge in manufacturing investment in the late 1960s and early 1970s. In 1970 and 1971, manufacturing's share of total investment exceeded that of either government or residential construction, and total per capita real investment approached the Canadian average.

Investment in the services sector in Nova Scotia has shown consistent growth over the 1950-80 period. Between 1961 and 1981, Real Domestic Product in services increased at an average annual rate of 4.2 percent, while employment grew

at a corresponding 6.1 percent. This resulted in part from Halifax's role as a port and general service centre for the Maritimes. The provincial capital also benefited from the decentralization of federal administrative activities during the 1960s. Tourism increased in importance throughout the 1960s and early 1970s, but subsequently fell off due to the rising price of gasoline. Recently, the province has taken advantage of the trend from automobile to bus travel, and plans are to increase overseas promotion of bus tours.

Government investment has accounted for a substantial, albeit gradually declining, share of total investment in Nova Scotia. Federal support spurred several important investments in the late 1970s. Heavy construction at the Fairview Cove container terminal occurred in 1982. Two other recent projects, the redevelopment of the local naval establishment and the construction of a large drydock, will contribute to the resurgence of the port of Halifax.

A.4 New Brunswick

The New Brunswick economy is characterized by a basic regional differentiation, with resource-based industries concentrated in the north and service, government and non-resource-based manufacturing activities located in the south. As in the other Atlantic provinces, production is largely export-oriented due to a small, scattered provincial market and distance from major Canadian markets.

During the 1970s, total real per capita investment in the province grew at an average annual rate close to that for Canada as a whole (see Table A.4). The 1960s witnessed rapid growth, as real per capita investment increased at an average 6.8 percent per year compared to 3.7 percent for Canada. Much of this increase resulted from an expansion in manufacturing investment over the period. In contrast, expenditures by utilities accounted for most of the growth in per capita investment during the last decade.

Manufacturing in New Brunswick is dependent on the processing of natural resources. Pulp and paper comprises the largest proportion of value of manufacturing production. Other important industries include food and beverage products

TABLE A.4

INVESTMENT IN NEW BRUNSWICK

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	328	13.9	16.4	13.4	9.4	6.9	19.0	21.0
1952	325	13.5	12.1	15.0	9.8	8.0	16.5	25.3
1953	324	14.3	9.5	11.6	5.7	14.0	20.8	24.2
1954	354	11.6	6.9	14.5	5.5	12.1	26.1	23.3
1955	468	11.8	6.8	9.0	10.8	7.2	26.5	27.9
1956	522	13.2	8.8	11.3	11.6	6.2	22.4	26.5
1957	420	10.6	9.2	15.4	7.7	7.6	18.3	31.2
1958	468	8.2	13.6	11.3	5.8	6.3	25.2	29.6
1959	501	8.6	26.7	9.9	5.5	7.8	20.1	21.2
1960	434	10.4	16.3	10.3	8.8	10.4	21.5	22.4
1961	407	10.0	12.5	10.1	9.7	10.0	21.3	26.5
1962	409	11.9	12.7	12.0	8.9	8.3	19.0	27.2
1963	414	17.1	13.3	10.4	9.3	9.4	17.9	22.8
1964	549	12.1	20.6	8.3	10.7	10.3	18.0	19.9
1965	672	11.7	18.8	8.0	16.7	10.2	16.3	18.3
1966	741	10.3	23.3	8.6	14.8	6.9	18.1	18.1
1967	701	8.4	14.3	10.2	17.4	6.6	22.8	20.3
1968	606	9.4	9.8	10.2	13.2	10.5	16.9	30.0
1969	685	11.4	24.5	12.8	5.2	8.6	10.8	26.7
1970	793	7.5	30.1	9.0	4.3	8.3	16.3	24.4
1971	782	8.8	27.9	7.1	9.0	8.4	14.6	24.3
1972	726	8.6	16.9	9.2	7.6	11.1	16.2	30.4
1973	853	8.7	11.2	9.5	11.1	10.7	15.7	33.1
1974	1106	8.1	19.5	9.9	13.3	7.7	15.5	26.0
1975	1135	8.7	22.1	6.9	17.5	6.5	14.6	23.8
1976	1035	9.6	11.8	7.3	19.5	7.6	15.5	28.6
1977	941	9.6	10.1	7.2	24.3	8.6	18.0	22.2
1978	983	7.8	10.9	5.7	26.0	10.8	16.4	22.5
1979	1130	8.1	14.3	5.8	24.6	12.4	13.3	21.5
1980	980	11.4	13.2	9.8	21.1	11.0	13.6	19.9

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

and chemical products. Relative to the rest of Canada, manufacturing's share of real per capita investment was generally high throughout the 1960s and early to mid-1970s. This share peaked in 1970-71 as a result of the construction of three new forest products plants, expansions at existing plants and major investments by Irving Refining Limited, the Saint John Shipbuilding and Drydock Company, and McCain Foods. The Irving refinery was originally built in the late 1950s and began operating in May of 1960. A major expansion was undertaken eleven years later when capacity was augmented from 45,000 to 120,000 barrels per day (b/d). The latest expansion was completed in 1976 at a cost of approximately $100 million, and was largely responsible for the relative surge in real manufacturing investment in the mid-1970s. At a capacity of 250,000 b/d, the Irving refinery is the largest in Canada.

New Brunswick has large reserves of base metals, having produced 23 percent of Canada's zinc, 24 percent of lead and 17 percent of silver in 1979. Real Domestic Product in mining grew rapidly during the first half of the 1960s, and demonstrated an average annual growth rate of 17.7 percent over the entire decade. This was due to significant discoveries of base metals in the Bathurst-Newcastle region in the early 1960s. In the 1970s, mining investment was not as strong, although the Brunswick Mining and Smelting Corporation did expand its lead-zinc mine during the period. In 1979 construction began on two potash mines near Sussex and the Mount Pleasant tungsten and molybdenum mine in the south of the province. The potash mines are being developed by the Potash Company of America and Denison Mines Limited, and a third site is under consideration by BP Exploration Canada Ltd.

World demand for base metals has experienced a recent decline. The New Brunswick mining industry has been protected somewhat by the depreciation of the Canadian dollar, existing contracts with European countries, and lower inventories due to strike activity. The developments mentioned above and recent exploration in uranium and bituminous shale should help to diversify the mining sector. In addition, there is considerable interest in the refining of base metal concentrates within the province. The coal industry, which

almost disappeared in the 1960s, has shown some recovery. The New Brunswick Electric Power Commission (NB Power) was recently granted exclusive rights to the province's limited coal reserves. These reserves are sufficient to supply existing coal-fired plants.

Expenditures by utilities stimulated total investment at various points over the 1950-80 period. In the mid-1950s, NB Power constructed the Beechwood hydroelectric plant on the Saint John River. During the latter half of the 1960s, major investments were made at the Mactaquac hydro site and the Dalhousie oil-fired generating station. Investment activity was stepped up again starting in 1973, with a succession of power developments--the 1,000-megawatt Coleson Cove oil plant, the Point Lepreau nuclear station, and additions at Dalhousie and Mactaquac. The CANDU unit at Point Lepreau was finished in the summer of 1982 at a total cost of $1.2 billion. The completion of these major developments contributed to the slackening of utility investment, and total investment, in 1980. Proposed projects for the rest of the 1980s include a second reactor at Point Lepreau, conversion of the Coleson Cove plant to coal or natural gas, and another transmission intertie with Quebec.

New Brunswick agriculture has exhibited a long-term decline similar to the trends in other Canadian provinces. Today, the major agricultural products in the province are those used for export--potatoes, dairy products and livestock. Given its dependence on potato production, the agricultural sector is vulnerable to sharp yearly variations in price arising out of weather and international market conditions. The local fishery is mainly inshore, but shows considerable diversification. Molluscs and crustaceans (lobster, crab, scallops, and shrimp) make up over half of landed value. New Brunswick is heavily forested, with over 80 percent of its total land area being productive forest land, primarily spruce and balsam. The forest products industry grew substantially in the 1960s amd early 1970s as a result of expansion in both domestic and foreign demand. This growth coupled with the recent budworm infestation has created a supply situation in which the province's softwood is being used to capacity. As for the lumber industry, until 1982 demand in overseas countries helped to cushion the

impact of the declining U.S. housing market. Prospects for growth in the forestry sector are limited given the general recession, expected increases in North American newsprint capacity, and depressed U.S. housing demand.

The services-producing industries increased rapidly throughout the 1960s and 1970s to account for 70 percent of New Brunswick jobs in 1980. With the recent decline in residential construction, heavy construction holds the greatest investment potential, particularly in regard to pulp mill renovations and the potash mining developments. An expansion is underway at the Saint John Shipbuilding and Drydock Company and further investment in port facilities is planned. Offshore and Arctic petroleum production could provide significant stimulus to the provincial shipbuilding and repair industry in the future.

A.5 Quebec

Quebec's economy is highly urbanized and industrialized, second only in this respect to Ontario's. Production in manufacturing is relatively more important in both volume and diversity than in Canada as a whole. With the exception of forestry, the primary industries' share of Real Domestic Product is smaller than the national average. Utilities, commercial services and trade play a relatively more important role in the Quebec economy.

The pattern of provincial investment is shown in Table A.5. During the 1950s, total per capita investment increased in real terms at an average annual rate above that for all of Canada. After the recession of 1957 to 1961, this situation was reversed, with per capita investment in Quebec demonstrating the second lowest growth rate in the country between 1960 and 1970. The main reason for Quebec's poor performance during this period was structural difficulties in its manufacturing sector. Investment subsequently underwent a recovery in the first half of the 1970s due to major government projects such as the James Bay hydroelectric development, the Olympic Stadium and the Montreal subway. The resurgence in private manufacturing investment in 1973 and 1974 was also a contributing factor. Since 1975, per capita real investment has fallen off somewhat, although its rate of

TABLE A.5

INVESTMENT IN QUEBEC

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	440	11.7	17.8	9.6	10.0	7.3	14.6	29.0
1952	508	10.8	17.0	10.9	12.3	5.5	15.1	28.4
1953	515	13.6	13.0	13.7	7.7	7.6	12.3	32.0
1954	502	12.1	14.3	10.5	9.6	8.8	11.6	33.1
1955	558	10.9	16.0	9.3	8.9	6.9	10.8	37.2
1956	608	11.6	17.9	11.0	10.0	7.6	10.4	31.6
1957	630	9.8	18.1	14.3	13.7	8.1	10.5	25.4
1958	629	7.9	14.2	14.8	14.0	8.6	10.5	30.0
1959	616	9.1	14.8	15.4	11.2	10.6	10.5	28.1
1960	564	9.9	14.8	16.3	9.8	11.9	11.9	25.4
1961	538	9.7	14.6	11.9	12.0	13.0	11.4	27.5
1962	559	9.0	15.5	9.9	11.2	12.0	11.7	30.7
1963	566	9.1	16.0	9.8	11.7	11.1	11.5	30.7
1964	673	8.9	16.6	8.7	14.3	9.9	13.6	28.1
1965	711	7.2	17.1	9.8	13.2	12.0	13.2	27.5
1966	702	7.5	19.9	10.5	12.0	14.8	12.1	23.2
1967	628	7.9	18.9	11.0	11.0	12.7	12.8	25.7
1968	612	8.3	18.9	9.9	9.8	11.4	12.4	29.2
1969	619	8.6	18.3	10.2	7.8	9.8	15.7	29.6
1970	600	8.4	18.2	9.7	8.8	10.0	15.5	29.4
1971	688	11.3	13.1	8.3	9.7	9.2	18.0	30.4
1972	760	12.8	14.1	8.7	9.2	12.1	16.8	26.8
1973	838	11.2	16.1	8.9	9.7	12.7	15.5	25.8
1974	907	8.9	18.2	8.9	8.8	15.6	14.4	25.2
1975	986	9.8	15.0	8.3	12.2	19.7	14.4	21.5
1976	951	10.8	11.5	8.1	13.0	15.8	13.1	29.8
1977	951	10.4	11.0	8.2	18.6	10.8	13.5	27.4
1978	892	7.5	11.9	8.7	24.2	10.6	13.0	24.2
1979	888	8.4	12.2	9.1	24.1	11.9	11.8	22.4
1980	865	9.1	17.1	9.4	20.6	12.2	12.7	19.0

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

decline has been mitigated by construction activity at James Bay.

Quebec manufacturing is still heavily weighted towards its traditional industries of forest products, primary metal processing, and clothing and related industries (textiles, hosiery, and leather goods). This third industry group, which is located primarily in the Montreal area, developed as a result of tariff protection and an abundant supply of labour. It has generally been characterized by low growth and low productivity. The weakness of Quebec's industrial structure became clear in the 1960s, as economic activity shifted to Ontario where there was a relatively high concentration of rapid growth durable industries (e.g., iron and steel, automobiles, electrical products and machinery).

In recent years, the Quebec government has encouraged a transfer of industrial activity from labour intensive industries to high growth industries--processed foods, transportation equipment, plastic products, chemicals, machinery, electrical products, scientific and professional equipment, and industrial research and development. The 1970s witnessed a surge in the aerospace industry, starting in 1974 when Canadair Limited launched the Challenger business jet program. Since that time, strong commercial and defence-related demand has made aircraft and parts one of Quebec's most promising industries, and has stimulated growth in the associated electronics sector. Another transportation equipment subindustry which shows long-term potential is rail equipment. In 1972, Bombardier Inc. of Montreal started an urban transit division to compensate for its sagging snowmobile business. The company has subsequently landed contracts to manufacture trains and subway cars for cities in Canada, the United States and Mexico, including its recent $1 billion contract with New York City.

It is hoped that private sector investment will fill the gap left by the James Bay hydro project, which is presently three-quarters complete. Since its start in 1971, the project has provided vital support to Quebec's construction industry and to local manufacturers of electrical equipment. At the peak of construction activity, approximately 18,000 people were employed at James Bay. Capital spending by the

James Bay Development Corporation ran in the order of $2 billion annually in the late 1970s, peaking at $2.8 billion in 1980. This 1980 peak accounted for roughly three-quarters of capital expenditures by electric utilities; utility investment, in turn, accounted for 24 percent of real non-residential investment in Quebec.

In fact, the utilities sector has helped to sustain total investment in Quebec at various times during the last thirty years. In the 1950s, Hydro-Quebec undertook major investments on the Bersimis River and at the Beauharnois site on the St. Lawrence. The provincial government consolidated Quebec's electric utilities at the beginning of the next decade and started construction on the Manicougan-Outardes complex. Between 1965 and 1971, 2600 megawatts (MW) of generating capacity were installed on the Manicougan River, with an additional 1200 MW coming on stream by 1976. At the Outardes development, 1400 MW of capacity were installed in 1969, and a further 500 MW in 1978. In total, the Hydro-Quebec system stood at 20,500 MW at the end of 1980, 3700 MW of which were installed units at James Bay.

When it is completed in 1985, the first phase of James Bay (10,300 MW) will have cost approximately $15 billion. Phase II (2300 MW), which was to have started in the early 1980s, has been postponed due to a decline in electric power demand growth. This will result in a decline in construction employment and Hydro-Quebec investment until activity picks up in the latter half of the decade. Meanwhile, the utility will complete some smaller projects, including the Gentilly 2 nuclear station (685 MW), and will upgrade its internal transmission network and interconnections with New York and New England. The oil-dependent northeastern states offer potential for marketing Quebec's growing power surplus, as well as for building hydro capacity in advance of domestic needs. Other opportunities for utility investment include programs on biomass, solar energy, fusion and electrochemical storage. Hydro-Quebec's Research Institute (IREQ) spent $2.9 million on new sources of electricity in 1980.

Historically, Quebec's vast hydroelectric resources not only stimulated utility investment but also fostered industrial development in the province. The aluminum

industry, a major exporter, developed as a result of cheap power rates and access to good water and rail transportation. During the 1950s, the Aluminum Company of Canada brought its generating capacity to 2400 MW with three projects on the Peribonka River. Most of Alcan's smelting capacity was installed before 1960, except for a major investment at La Baie in the early 1970s. Recently, the company has embarked on a ten-year modernization and expansion program which includes a $500-million smelter under construction at Grande Baie in the Saguenay area. Quebec's other main aluminum producer, Reynolds Aluminum Company of Canada Ltd., is planning an equivalent expenditure at its Baie Comeau plant, originally built in the late 1950s. These investments are proceeding despite a slackening in aluminum demand. The market for aluminum remained strong through the latter half of the 1970s due to high levels of demand and low inventories, but by the early 1980s the world recession had begun to show its effect.

Mining in Quebec is relatively diversified, with major deposits of iron ore, asbestos, copper, zinc, gold and silver. The province began mining and exporting iron ore from the North Shore shortly after World War II. In 1959, the opening of the St. Lawrence Seaway provided a boost to the industry by increasing access to the industrial heartland of Ontario and the mid-western United States. Investment activity continued through to the 1970s, with considerable expenditures by Iron Ore Company of Canada, Quebec Cartier Mining Company, and Sidbec-Normines Inc. in the early part of the decade. The 1980s, however, have witnessed a decline in world steel production, resulting in production cutbacks and layoffs, and, most recently, in the closure of IOCC's Schefferville operations. Asbestos has also been suffering due to reduced construction demand, as have zinc and, to a lesser extent, copper. After increasing steadily from $0.8 billion in 1972 to $2.5 billion in 1980, the total value of mining production registered its first decline in a decade in 1981. Recent exploration and development has been concentrated in copper, zinc and precious metals, given the relatively poorer prospects for asbestos and iron ore. Two major new mines began producing in 1981, the Selbaie copper-zinc-silver mine of Selco Inc. and Falconbridge's Kiena Gold Mines Ltd. near Val d'Or, which together accounted for an investment of $105

million. An additional two gold mines brought the provincial total to ten producing mines, with five mines still under construction.

Forest products, in particular pulp and paper, remain Quebec's most important export. Between 1961 and 1974, employment in forestry dropped by 30 percent while real domestic product increased almost 50 percent. These changes were brought about by the mechanization of forest operations. In recent years, softwood supply problems have emerged due to the remoteness of forest resources and severe overcutting in many regions. Nevertheless, both output and investment remained strong in the latter half of the 1970s as a result of favourable markets for newsprint and the devaluation of the Canadian dollar. With the help of government incentives, the pulp and paper industry embarked on a massive modernization and expansion program, accounting for the doubling in its current dollar investment between 1979 and 1981. Since then, the forest products sector has been hit by sagging demand. In the vital U.S. market, high inventories have reduced newsprint demand, while low construction starts have severely restricted imports of lumber. However, many producers are already committed to their capital expenditure programs. For example, Consolidated-Bathurst, Quebec's largest newsprint producer, will spend $580 million between 1982 and 1983 to expand its newsprint, groundwood and pulp capacity.

Quebec is the foremost province in both dairy and pork production. Agricultural employment declined quite dramatically between 1966 and 1981, from 6 percent of the work force to 3 percent. This sector has not been subject to the wide price fluctuations experienced in, for example, the Maritime potato industry.

In terms of investment activity, both transportation equipment and food and beverages demonstrated substantial gains during the 1970s. Between 1976 and 1981, current dollar investment in transportation equipment increased 300 percent, while the comparable increase in food and beverage investment was 117 percent. Examples of products that have increased their export shares are evaporated and powdered milk, yogurt and cheese. Despite these gains, major investors in Quebec manufacturing continue to be the established

industries of pulp and paper, primary metals, and textiles. Together these industries accounted for almost 40 percent of total manufacturing investment in 1980. Much of the recent capital spending in pulp and paper and clothing-related industries has been due to government schemes aimed at upgrading and modernization.

Quebec has also developed a substantial petroleum refining industry, encompassing 26 percent of total Canadian capacity in 1979. All of the province's seven plants are located in an area east of Montreal, except for the Ultramar Canada Limited refinery near Quebec City. Provincial refining capacity increased from 143,000 to 617,400 barrels per day (b/d) between 1950 and 1979. Three major plants were constructed in this period: a 95,000 b/d refinery, first operated in 1955 and now owned by Petro-Canada; BP Oil's 73,000 b/d refinery, first operated in May 1960; and the Ultramar refinery (100,000 b/d), first operational in October 1971. Ongoing investment projects include a $200-million upgrading of the Ultramar refinery and a $100-million upgrading plant being built by Petro-Canada. BP Canada will shut down its Montreal refinery in May of 1983 due to reduced oil consumption. This plant was acquired by Petro-Canada late in 1982 as part of the acquisition of BP's oil marketing facilities. In addition, the decline in consumption has forced the cancellation of plans for a $1.2-billion heavy fuel oil upgrader planned by a consortium of companies for the Montreal area.

Quebec's oil refineries also provide feedstock for its growing petrochemical industry. With 14 plants in 1981, the province was one of three major petrochemical producers, the other two being Ontario and Alberta. The rapid growth in world petrochemical demand stimulated a revamping of the industry starting in 1973. Hercules Canada Ltd. completed Canada's first polypropylene plant at Varennes in 1977. Investment in chemicals and chemical products peaked at 19 percent of total manufacturing investment in 1978, and has maintained a generally high level since that time.

From the early 1970s, construction investment has been sustained by a series of large projects comprising James Bay, the Olympic Stadium, the Montreal Metro and major water treatment facilities. Housing starts fell from their 1976

peak of 68.7 thousand to 29.2 thousand in 1980. The main potential for increased construction activity lies with engineering projects such as the pulp and paper modernization program and the $500-million first leg of the Trans-Quebec and Maritimes Inc. gas trunkline extension. The last period of major pipeline construction was the mid-1970s when the Interprovincial Pipeline Company extended its 30-inch oil pipeline from Sarnia to Montreal. Construction on the Montreal to Quebec city gas extension began in May 1981 and will be completed in 1984.

The service-producing sector has accounted for most of the job creation in Quebec in recent years. The greatest expansion in employment occurred in commercial services which increased at an average annual rate of 4.5 percent between 1961 and 1981. During the 1960s, investment grew at a rate less than half the national average, reflecting a shift in financial activities to Ontario. By 1980, growth in real domestic product had slowed considerably due to the westward realignment of economic activity and a movement of corporate head offices to Toronto. However, Montreal shows potential for recovery as a primary service centre because of its recent gains in high technology industry and because of its role as a transportation hub for air, rail and water travel. Port activity has increased substantially in the last thirty years. In 1959, the Seaway opened up Quebec City for shipment of iron ore and, later, coal and grain, while Montreal has been the fastest growing container port in Canada since the introduction of this technology in the late 1960s. Shipbuilding has undergone recent diversification as a result of strong international competition. In 1978, Davie Shipbuilding Ltd. of Lauzon began manufacturing jack-up drilling rigs. The industry is hoping for major spin-offs from the Beaufort Sea and east coast offshore oil developments.

A.6 Ontario

The Ontario economy is advanced and highly diversified. Historically, its development was fostered by a favourable geographical setting--central to Canada and accessible to U.S and overseas markets--and by an abundant pool of labour. There is considerable regional differentiation within the province. Southern Ontario has the most diversified

economy, with well developed manufacturing, agricultural and service sectors. Northern Ontario's economy is based on its natural resources, important industries being mining and forestry. Agriculture and the public sector dominate eastern Ontario, which centres around the nation's capital and, recently, activity in high technology industries has been expanding.

Over the last thirty years, manufacturing and the service industries have been relatively more important, and the primary industries relatively less important, in Ontario than in Canada as a whole (see Table A.6). The 1950s marked the beginning of a period of major industrialization for the province. Total per capita investment grew in real terms at an average annual rate somewhat less than the rate for all of Canada. In the next decade, however, real per capita investment increased at an average 4.6 percent per year, compared to 3.7 percent for Canada. This pattern was reversed in the 1970s, during which the province recorded an average annual decline of 0.3 percent.

A large part of the total investment trend in Ontario over the last three decades can be explained with reference to developments in manufacturing. Ontario accounts for about half of Canada's manufacturing industry. Two important developments stimulated manufacturing in the 1960s: the devaluation of the Canadian dollar in 1962 and the 1965 Canada-U.S. Automotive Free Trade Agreement. The effect of the Auto Pact was quite immediate, with a 27 percent rise in Canadian vehicle production and a virtual doubling of car and truck exports in 1965. Expansion programs were undertaken by the major producers, led by Ford Canada's $135-million spending program. This stimulus to production and investment was felt not only by automobiles and parts manufacturers but also by input-supplying industries such as iron and steel, rubber, glass, textiles and electronics. In total, Real Domestic Product in manufacturing grew at an average annual rate of 7.2 percent between 1961 and 1970.

The comparatively poor performance of the 1970s was due to several factors including the appreciation of the Canadian dollar during the early part of the decade and growing import competition in several industries (e.g., automo-

TABLE A.6

INVESTMENT IN ONTARIO

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	625	12.6	22.6	8.8	13.4	9.8	10.4	22.5
1952	657	10.3	24.5	9.9	11.7	7.0	15.2	21.4
1953	700	9.8	22.8	9.2	12.8	9.9	11.0	24.5
1954	678	10.2	18.9	8.9	10.7	11.5	10.3	29.5
1955	695	11.5	17.4	7.7	8.4	10.9	10.3	33.7
1956	793	13.4	21.8	8.8	8.5	9.4	11.2	27.0
1957	848	13.0	20.4	12.9	10.8	9.3	11.2	22.3
1958	782	8.8	16.0	14.2	10.0	9.1	12.2	29.7
1959	702	8.5	17.1	10.6	9.4	10.1	14.0	30.3
1960	665	8.5	19.2	10.6	8.6	11.1	14.9	27.1
1961	636	8.0	18.9	9.5	8.8	11.1	16.0	27.8
1962	660	7.7	21.4	9.6	7.6	10.8	14.6	28.4
1963	684	8.4	20.3	10.1	7.2	10.1	14.6	29.4
1964	731	8.2	24.2	9.9	6.5	10.7	12.8	27.7
1965	809	8.0	26.5	9.0	6.4	10.3	11.2	28.4
1966	894	9.6	26.8	8.4	7.4	10.4	11.6	25.7
1967	872	9.9	22.3	8.7	7.8	11.4	12.1	27.8
1968	879	9.0	17.9	9.0	9.4	10.6	12.0	32.0
1969	935	8.0	19.9	8.2	10.0	11.2	11.2	31.4
1970	967	8.2	23.5	8.7	10.6	11.7	11.0	26.3
1971	968	8.1	17.8	10.0	10.9	11.9	12.0	29.3
1972	1005	8.0	16.3	10.4	8.9	13.5	12.5	30.5
1973	1071	7.4	16.8	9.0	9.6	15.0	11.7	30.4
1974	1100	7.6	19.1	9.2	8.8	15.1	12.7	27.6
1975	1051	8.1	22.1	10.1	10.6	13.7	12.6	22.7
1976	1026	8.7	21.6	8.7	8.3	13.0	11.4	28.3
1977	997	8.7	22.8	8.3	8.1	13.1	11.0	28.0
1978	965	8.7	19.8	8.8	10.8	14.9	10.8	26.2
1979	962	9.8	20.7	9.4	10.2	16.6	10.4	22.9
1980	968	9.8	25.0	9.6	9.6	17.5	9.8	18.8

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

biles, textiles, appliances and chemicals). The slowdown of 1974-75 was accompanied by a drop in capacity utilization. This was a direct result of higher energy costs and costs associated with meeting pollution control standards, both of which acted to make older plants inefficient. Investment activity recovered in the latter part of the 1970s, in part because some manufacturers had postponed their modernization programs during the slowdown. However, the early 1980s have seen renewed difficulties with the deepening world recession, except for the expansion of high technology industries.

On an individual industry basis, food and beverages, transportation equipment, metal fabricating, primary metals, pulp and paper, and electrical products have all been important to Ontario manufacturing. Together these industries averaged 50 percent of total manufacturing investment between 1970 and 1980. A major contributor in terms of employment has been the automobile industry. Recently, auto manufacturers have been hit by high interest rates and competition from Japanese imports, resulting in massive layoffs. Nevertheless, the industry is proceeding with a program of plant conversions to serve the changing U.S. market.

The provincial steel industry did not fare as badly in the early stages of the recession, due to its competitiveness and success in finding new offshore markets. Canadian steel capacity increased 6 percent in 1980 with the addition of the STELCO (Steel Company of Canada) plant at Nanticoke. Investment in metal fabricating has been maintained at a generally high level since the mid-1970s, reflecting determination on the part of steel producers to remain competitive through the addition of new technology. Stelco, Dominion Foundries and Steel, and Algoma Steel Corporation all have major expansions underway. The short-term market outlook is not favourable given the status of purchasing industries such as automobiles, construction, farm equipment and appliances. However, opportunities for future production and investment do exist in energy-related developments such as pipeline construction and offshore oil and gas.

Manufacturing industries which demonstrate significant growth potential include the aerospace industry, pulp and paper, food and beverages, machinery, and various high

technology industries. Ontario's aviation industry has undergone substantial private and public investment activity since the collapse of the federal Avro Arrow project in the early 1960s. The province now produces a wide range of aerospace products, most important of which is the Dash 7 commuter aircraft manufactured by de Havilland Aircraft of Canada Ltd. A recent success was Spar Aerospace Ltd.'s remote control arm for the U.S. Space Shuttle. Elsewhere in the high technology field, the province's electrical industry has been diversifying into computers and telecommunications. Both the Ontario and federal governments have been encouraging development in such areas as microelectronics, robotics, biotechnology and information processing.

Primary industries averaged 8.9 percent of total investment in Ontario between 1951 and 1980, compared to 15.9 percent for the entire country. Agriculture has exhibited a general decline. The number of farms fell by about 40,000 from 1951 to 1966, while average farm size increased from 139 to 162 acres. Ontario has developed a number of specialized crops--tobacco, oilseeds, livestock, fruits and vegetables. Production is concentrated in the southern part of the province around the Niagara escarpment, and in the valleys of the St. Lawrence and Ottawa Rivers.

Forestry, in particular pulp and paper, has been an important industry to northern Ontario and to the Ottawa River area. Employment declined 9.4 percent between 1961 and 1981, due to technological improvements. In the late 1970s, the industry was hit by sagging demand and labour unrest. The decline in demand was felt first in lumber production, some 70 percent of which goes to the U.S. market. Currently, the province's mills are being modernized under a government-subsidized program, and efforts are being made to correct for the inadequate forest regeneration and management of the 1970s.

One of the most important industries of the post-war period has been mining. An important discovery of base metals was made at Manitouwadge, north of Lake Superior, in 1953. Throughout the rest of the decade and into the 1960s, new iron ore mines were opened up. The mid-1960s saw the construction of several iron ore pelletizing plants,

including Stelco's plant at Bruce Lake. All of Ontario's major minerals--nickel, copper, iron ore and zinc--registered increases in both output and value of production during the decade. Since 1970, however, the mining sector has been hurt by growing competition from Third World countries, strikes, closures and the recession. Between 1970 and 1980, Real Domestic Product in mining declined at an average annual rate of 4.2 percent. Nevertheless, Ontario remains the country's principal non-fuel mineral producer.

While Ontario has almost the lowest ratio of energy production to energy consumption of any of the provinces (except for Prince Edward Island), it is a modest producer of oil and gas. Recently, drilling has picked up in Lake Erie, the source of most of Ontario's gas production, with over 350 wells completed in 1981-82.

As a source of fuel for electrical generation, the provincial uranium industry began in the early 1950s with the discovery of a commercially viable deposit at Elliot Lake in 1953. By 1959, eleven of Canada's nineteen processing mills were located in the region. Canadian production peaked at 12,225 pounds in 1959 and subsequently fell off when the United States Atomic Energy Commission announced that it would not increase its uranium purchases from Canada. Between 1960 and 1964, the number of Canadian mines fell from twenty-one to four, three of which were located in Ontario. Capital expenditures remained generally low through the early 1970s, except for construction of the Agnew Lake mine near Espanola in the late 1960s. The real boost to uranium production came in 1973 with the first of the OPEC oil price increases. Foreign countries embarked on nuclear power programs and domestic electric utilities such as Ontario Hydro began to pursue long-term contracts for uranium. World uranium prices doubled in 1974 and again in 1975. The result was a major exploration effort, with Canadian exploration expenditures increasing in nominal terms from $23.9 million in 1975 to $129.5 million in 1979. In the late 1970s, however, the industry was hit by the effects of reduced electricity consumption, the Three Mile Island accident in the United States, and high interest rates. This led to the present glut in world uranium supply which will likely

continue through the 1980s given inventories and new production from South Africa and Australia.

Despite these developments, both Rio Algom Ltd. and Denison Mines Ltd. are proceeding with expansion plans. Denison has a $250-$300 million expansion underway at Elliot Lake to be completed by 1985. With no new orders for CANDU reactors abroad, the potential for industry growth appears to lie mainly in additional CANDU nuclear power units planned for Ontario and New Brunswick. In addition, there is interest in the production of steam for industrial purposes such as oil sands projects and chemical plants.

Aside from its uranium industry, Ontario's other major energy-related industry is electric power production. Ontario Hydro has carried out an extensive construction program over the last thirty years, contributing to its current status as the largest electric utility in North America. Utilities' share of total Ontario investment peaked at 13.4 percent in 1951 and generally maintained a high level throughout the rest of the decade. This marked the last period of large-scale hydroelectric development in the province. Important developments included two projects on the Ottawa River totaling 565 megawatts (MW), the Sir Adam Beck #2 Station (1224 MW) on the Niagara River, and the Robert H. Saunders Station (912 MW) on the St. Lawrence. Although a number of smaller hydro plants were installed through the early 1970s, the general trend after 1960 was towards steam-fired generation. Large fossil-fired generating stations were completed at Lakeview (2400 MW) in 1969, Lambton (2000 MW) in 1970, Lennox (2295 MW) in 1977, and Nanticoke (4000 MW) in 1978. Because of its reliance on imported coal and oil, Ontario had also decided in the early 1950s to pursue the nuclear option and thereby take advantage of indigenous uranium supplies. The first commercial station, Atomic Energy of Canada Ltd.'s 200-MW Douglas Point reactor, came on stream in 1966. Ontario Hydro subsequently built the Pickering A (2160 MW) and Bruce A (3200 MW) nuclear plants in the late 1960s and the 1970s.

Ontario Hydro is planning to install almost 10,000 MW of additional generation capacity by 1995. This includes three new nuclear stations: Pickering B scheduled for

completion in 1985, Bruce B targeted for the late 1980s, and Darlington for the early 1990s. The 3500-MW Darlington station is estimated to cost $7.69 billion and will employ 2,800 workers at its construction peak in 1985.

Ontario has also exercised an important role in petroleum refining and petrochemical production. In 1950, the province had four oil refineries yielding a total capacity of 75,200 barrels per day (b/d). By 1963, the number of refineries had doubled and capacity stood at 305,500 b/d. The major factors in this expansion were the 1950s oil boom in Alberta and the completion of the Interprovincial Pipe Line. Ontario refining capacity was increased to satisfy the federal requirement that petroleum production west of the Ottawa Valley be derived from Albertan crude. After 1963, refining capacity continued to increase, although the number of plants declined to seven. In the 1970s, two large refineries were added: the 170,000 b/d Petrosar Ltd. plant near Sarnia which began operating in 1977, and Texaco Canada's Nanticoke refinery (95,000 b/d) which opened the following year. The $400-million Nanticoke facility replaced Texaco's Port Credit operations. Since its completion, refinery construction has largely come to a standstill. In 1981, reduced consumption resulted in a 78 percent utilization factor for Ontario's 705,700 b/d of capacity. Petrosar cancelled a proposed $450 million heavy fuel oil upgrader, citing the effect of the recession. The one bright spot for construction is Suncor Inc.'s $335-million overhaul of its Sarnia refinery. Scheduled for completion in 1984, this project will increase the yield of transportation fuels as well as petrochemical feedstock.

More than 30 plants are involved in petrochemical production in Ontario. Growing world demand generated an increase in chemical industry investment of 566 percent, including inflation, between 1973 and 1977. The 1977 expenditure peak of $874 million marked completion of the Petrosar refining and petrochemical complex at Sarnia. This was Ontario's first world scale plant, with a capacity of 1 billion pounds of ethylene and 3 billion pounds of petrochemicals per year. It sparked additional construction and expansion in the area, including a $100-million polypropylene plant completed by Shell Canada in 1979. Recently, the

petrochemical industry activity in the Sarnia area has been hard hit by the world recession, high interest rates, escalation in the price of feedstock, and increasing competition from Alberta. Nevertheless, investment activity is continuing. Several expansions are underway and Esso Chemical Canada, Polysar Ltd., and C-I-L Inc. are building plants for a total investment of over $550 million.

Ontario's construction industry has not been stimulated by engineering projects to the extent that has occurred in other provinces such as Quebec, Alberta and British Columbia. In part, this reflects the fact that even during the 1950s, the province's infrastructure and its capital stock in general were well developed relative to other regions of Canada. Some stimulus was, however, provided by nuclear power development in the late 1960s. Housing has accounted for a significant part of total investment, although housing starts peaked at 110,536 in 1973 and subsequently fell to 40,127 in 1980. In general, residential investment has been choked off by high interest rates. This situation has persisted despite a considerable shortage of rental accommodation.

The service-producing industries have shown substantial gains over the last twenty years in terms of Real Domestic Product, employment, and investment. Growth has been highest in community, business and personal services which registered a 162 percent increase in real value added and a 217 percent increase in employment between 1961 and 1980. During the 1970s, finance, insurance and real estate were one of the stronger growth sectors in the economy. The movement of company head offices from Montreal to Toronto accounted for a portion of this growth.

Another relatively strong sector over the last decade was transportation and communications. In the 1950s, investment in transportation was sustained by several large projects including the Toronto subway, the oil pipeline from Alberta to Sarnia, the gas pipeline from Alberta to eastern Canada, and the St. Lawrence Seaway. These last two projects were responsible for the 1958 peak in transportation investment corresponding to 14.2 percent of total real per capita investment. The Seaway had a major effect on the volume of

foreign trade handled by Ontario ports, in particular the Lakehead ports of Fort William and Port Arthur which are the trans-shipment point for western grain. Between 1958 and 1964, the volume of cargo through provincial ports increased 47 percent. Since then, there has been considerable growth not only in water transporation but also in rail, road and, especially, air transportation. Most recently, technological innovation has led to productivity gains in communications--television, computers, satellites, coaxial cable and microwave relay.

A.7 Manitoba

Relative to the other prairie provinces, Manitoba has a more structurally diversified economy. However, the province is nontheless very dependent on the extraction and processing of its natural resources. Manitoba demonstrates a varied manufacturing sector and strong tertiary industries which supply both the provincial resource sector and the rest of western Canada.

Real per capita investment grew strongly at 5.3 percent and 4.7 percent during the 1950s and 1960s, respectively. Investment in manufacturing and the electric power industry provided the major impetus (see Table A.7). In the 1970s, capital spending stagnated with all sectors except services and primary industry recording declining real growth rates.

The Manitoba economy was originally built on agriculture, but as economic activity became more diversified farming assumed a less important role. Today major crops include wheat, barley, flax, canola, oats, and livestock. Between 1951 and 1976, the number of farms declined 39 percent while average farm size increased 75 percent, and there was a substantial decrease in the number of people living on farms. By 1976, the farm population had fallen to half its 1951 level, a decline from 28 to 11 percent of total population. In keeping with the trend throughout Canada, agricultural productivity increased due to greater mechanization. Capital investment per farm--including land, buildings, livestock and machinery and equipment--soared from $17,500 in 1951 to $141,300 in 1976, representing an eightfold increase.

TABLE A.7

INVESTMENT IN MANITOBA

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	502	30.8	7.2	11.9	7.8	11.4	12.2	18.7
1952	502	28.3	4.5	14.3	9.2	7.5	18.3	18.0
1953	580	24.2	3.7	13.1	10.5	8.3	17.1	23.2
1954	539	20.5	9.4	15.7	7.8	9.3	12.2	25.2
1955	575	20.5	9.0	11.7	6.8	7.9	14.2	29.9
1956	654	19.2	6.4	16.1	6.4	8.8	17.5	25.6
1957	638	17.3	8.0	22.1	9.3	8.8	14.1	20.4
1958	687	16.7	11.7	13.6	10.3	11.6	13.5	22.7
1959	783	17.1	11.9	11.7	12.5	11.7	14.5	20.6
1960	761	17.9	10.1	14.5	9.3	11.0	14.9	22.3
1961	637	17.0	6.5	11.1	11.0	10.6	16.4	27.4
1962	627	19.0	5.8	12.1	14.2	10.8	17.0	21.0
1963	695	19.2	5.6	14.5	15.1	10.1	16.0	19.5
1964	712	21.5	7.7	12.6	10.5	8.4	17.3	21.9
1965	685	22.8	10.4	11.3	7.5	9.9	16.7	21.4
1966	801	21.9	10.9	10.4	8.8	10.4	18.2	19.4
1967	861	22.0	8.9	13.4	13.0	9.6	14.5	18.8
1968	976	19.3	10.0	13.1	17.3	7.0	16.0	17.3
1969	1017	18.3	9.3	11.6	11.9	8.8	18.4	21.8
1970	938	16.9	12.5	11.4	10.6	9.3	15.8	23.5
1971	821	16.5	7.0	11.5	13.2	8.7	16.1	26.9
1972	932	17.5	5.2	14.6	13.5	9.1	15.4	24.8
1973	1004	18.3	6.0	11.8	18.8	8.5	12.9	23.8
1974	1031	18.1	7.6	11.7	20.2	8.7	9.6	24.1
1975	995	20.2	5.8	11.0	23.6	9.8	10.1	19.6
1976	1084	20.0	4.1	9.5	20.5	13.1	10.2	22.6
1977	1040	19.1	4.2	11.2	18.5	10.6	9.9	26.4
1978	1016	23.0	4.3	9.2	11.2	11.8	12.1	28.4
1979	950	25.2	5.6	9.0	7.9	19.1	11.6	21.6
1980	866	26.4	6.6	12.4	5.9	20.8	12.1	15.8

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

Historically, food products have accounted for about one-third of manufacturing shipments, although in the 1970s they declined in importance relative to durable goods. Investment in the food and beverage industry has accounted for between 10 and 37 percent of total manufacturing investment. The industry underwent significant capacity expansion during the early 1960s and again during the early 1970s. Manitoba manufacturing is characterized by a large number of small companies. For example, in 1959, 69 percent of manufacturing firms had fewer than 15 employees; in 1970, 90 percent employed fewer than 100 persons. Important industries in addition to food and beverages are primary metals, transportation equipment and clothing but there are a number of additional industries that extend the diversification.

Of all the industrial sectors in Manitoba, manufacturing displayed the strongest average annual growth rates in real investment during the 1950s and 1960s, corresponding to 15.5 percent and 11.1 percent, respectively. This situation was reversed in the 1970s with real investment declining at an average rate of 5.6 percent per year over the decade. However, activity subsequently picked up in 1979, 1980, and 1981. These three years witnessed nominal investment spending increases of 31, 12, and 53 percent, respectively.

The mining industry is centred in northern Manitoba where copper, nickel and zinc are produced. These metals account for about 95 percent of the value of output in provincial metal mining. A great deal of exploration occurred after the Second World War with the result that several mines opened in the early 1950s including the Lynn Lake copper-nickel mine. The INCO Metals complex at Thompson started production in 1961. Between 1961 and 1971, capacity was expanded from 75 to 170 million pounds of nickel. Capital expenditures for the expansion totaled $181.5 million during the 1966-70 period. Mining value added grew at an average annual rate of 4.7 percent over the entire decade. A number of new mines were opened in the late 1960s and early 1970s including Birchtree, Fox, Soab North and South, Pipe, White Lake, Ghost Lake and Ruttan Lake. However, low levels of world nickel demand in the latter half of the 1970s forced cutbacks and mine closures. Current expansions of capacity

are mostly targeted for copper mines in the Trout Lake, Reed Lake and Snow Lake areas.

Capital expenditures on oil exploration and development began in the early 1950s and resulted in several discoveries in the Virden area. Expenditures peaked in 1954 at $22.6 million. There was little interest in oil throughout the rest of the 1950s, 1960s and 1970s. Not until 1981 did capital expenditures exceed $25 million. Recent attention has focused on the Waskada region. Although the new wells are modest producers, drilling costs are low because oil is found at shallow depths in this region.

For most of the 1950s, Manitoba had four crude oil refineries in operation. In 1958, the refinery at East Kildonan ceased operation. Then, in 1969 the Brandon refinery was closed. Imperial Oil closed its small Winnipeg operation early in 1975 when the company's new Strathcona refinery in Edmonton commenced production. Since then, Manitoba has had only one operating refinery, the Shell refinery at St. Bonface which was built in 1955.

Investment in its abundant hydroelectric resources was a source of major stimulus to the Manitoba economy during the 1960s and the first half of the 1970s. Until 1950, the province generated all of its electricity from six plants on the Winnipeg River. Large scale hydro development began in the early 1950s when INCO commenced nickel mining operations near Thompson. Industrial power demands resulted in the installation of the Kelsey generating station on the Nelson River in 1960. In 1966, the provincial government announced its intention to pursue further hydro development on the Nelson, leading to three major investments by 1980--Kettle Rapids (1224 MW) in 1970, and Jenpeg (186 MW) and Long Spruce (980 MW) in 1977. These last two projects caused utilites' share of total investment to peak at 23.6 percent in 1975. Since that time, Manitoba utilities' investment share has fallen off due to a decline in construction activity. Manitoba Hydro ceased construction on its fifth Nelson River project, the 1260-MW Limestone station, in 1978 because of reduced demand. Annual load growth, which had been running 6 to 7 percent u[illegible]il 1975, fell to 2 percent or under in the

late 1970s. A freeze on electricity rates was brought in at the end of the decade.

Eventual resumption of the Nelson River project will depend on an upswing in provincial demand or, alternatively, on the securing of firm export markets. In the last several years, Manitoba has been involved in negotiations with Saskatchewan and Alberta over a western power grid to link the three prairie provinces. The proposed $2-billion, 1,700-kilometre grid would have allowed Manitoba to export 500 MW of hydro power to Saskatchewan and 1000 MW to Alberta, starting in 1987. Recently, however, the project was postponed indefinitely, in large part because the Saskatchewan and Albertan governments objected to the fact that construction activity, and hence economic stimulus, would have been concentrated in Manitoba. Other electricity-related investment projects which have been held up or deferred are the proposed $700-million Mandan transmission line and the $500-million aluminum smelter under study by Alcan. The Mandan line between Manitoba and Nebraska has been stalled by South Dakota which opposes the shipment of summer surplus power to utilities in its neighbouring state. Despite these setbacks, Manitoba has been exporting about one-fifth of its electric generation to the United States in recent years. Among the province's major investment opportunities is hydro development on the Nelson, Churchill and Burntwood rivers in advance of domestic needs in order to make firm power sales to the United States.

Manitoba's construction industry has been highly influenced by these events in the electric power industry, as well as by primary resource expansion. Specifically, hydro and mining development accounted for the boom in construction in the late 1960s and early 1970s. The overexpansion which occurred during this period resulted in a marked slowdown in construction activity in the late 1970s. Real Domestic Product in construction was 46 percent lower in 1980 than its 1969 peak. In 1980-81, out-migration from the province combined with high mortgage rates brought housing starts below the 3000 unit level for the first time since World War II.

Growth in service sector investment has been one of the brightest areas in the Manitoba economy during the last

thirty years. Commercial services and finance, insurance, and real estate have shown the greatest gains since the 1950s. More recently, wholesale and retail trade have undergone an expansion. These three industries account for over 40 percent of value added in the province.

A.8 Saskatchewan

The Saskatchewan economy is based upon the production of unprocessed natural resources destined for foreign markets. Swings in international grain markets have periodically caused large changes in income and employment. The development of mining industries including oil coal, potash and uranium has provided some diversity, but these markets can also be highly cyclical.

Real investment in the 1950s and 1960s proceeded at rates well below the national average. Part of this was attributable to the extremely low rate of population growth in the province. From the early 1970s, however, investment was strong, only recently falling off. This strength was a result of increased oil and gas activity and of the development of other natural resources such as potash and uranium. Table A.8 documents investment trends since 1951.

Saskatchewan encompasses 50 percent of Canada's improved farmland, with wheat being the major crop. In 1980, 63 percent of farm cash receipts were derived from wheat sales. Cattle raising, canola, oats and barley account for most of the remainder. In 1951, Saskatchewan's farm population was 398,000, 48 percent of total population. Urban migration reduced this share to 33 percent by 1961 and to 25 percent by 1971. With this population shift, average farm size increased from 809 acres to 939 acres between 1961 and 1976. Increased mechanization raised productivity but fluctuating world prices for wheat and other crops have resulted in highly cyclical farm incomes. Attempts by the Canadian Wheat Board and various provincial programs to stabilize farm income have helped in dampening the wider swings.

Food processing is the major manufacturing activity in Saskatchewan, accounting for over 40 percent of manufacturing value added through the 1960s. Other manufacturing

TABLE A.8

INVESTMENT IN SASKATCHEWAN

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	493	51.3	5.1	9.1	5.8	7.1	8.6	12.9
1952	623	51.5	2.9	7.8	6.6	5.1	11.8	14.3
1953	700	46.7	4.8	8.4	6.0	7.5	9.7	16.9
1954	701	33.3	3.6	20.1	7.1	8.3	9.6	18.0
1955	631	38.2	2.4	12.9	7.0	6.8	9.8	22.9
1956	846	37.6	3.9	22.0	8.5	4.3	8.5	15.3
1957	764	36.4	3.2	17.4	9.5	4.6	11.8	17.2
1958	788	28.9	4.9	18.3	11.3	5.6	11.4	19.6
1959	740	31.5	4.6	11.9	10.8	6.9	11.8	22.5
1960	733	32.7	2.7	12.1	10.2	8.3	15.1	18.9
1961	709	30.8	2.9	9.3	12.8	7.4	16.3	20.5
1962	782	33.8	2.2	9.9	10.7	6.0	15.8	21.5
1963	876	41.0	3.0	11.6	7.7	6.8	11.3	18.5
1964	908	46.3	2.4	9.6	6.9	5.5	11.2	18.1
1965	1010	46.8	2.3	8.2	5.4	6.2	13.1	18.1
1966	1160	48.7	3.5	8.4	5.1	6.5	11.9	15.8
1967	1166	45.0	6.5	10.5	6.0	5.2	10.7	16.2
1968	1126	44.0	3.7	11.9	5.4	6.6	10.7	17.7
1969	866	39.2	2.0	14.7	4.7	7.5	12.0	20.0
1970	679	34.4	2.8	17.1	5.2	8.3	17.7	14.6
1971	717	34.5	4.0	16.3	5.2	6.9	16.9	16.3
1972	859	35.2	2.8	16.5	4.6	10.9	13.8	16.3
1973	955	39.2	3.5	13.8	3.6	8.9	14.1	16.9
1974	1071	39.7	4.1	10.0	3.3	7.8	15.1	20.0
1975	1326	39.8	3.4	8.5	4.8	8.1	13.3	22.2
1976	1465	35.9	3.9	7.4	5.6	9.1	11.6	26.5
1977	1382	33.5	3.3	9.2	6.4	9.3	11.1	27.4
1978	1335	40.0	2.2	7.4	5.3	8.6	12.3	24.2
1979	1556	39.6	3.6	6.5	4.9	12.2	11.2	21.9
1980	1501	42.6	3.5	8.9	5.5	11.4	10.3	17.8

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

industries have grown in the 1970s so as to reduce the province's dependence on agricultural products. These include non-metallic mineral products, metal fabricating and farm machinery. In 1981, Saskatchewan made its first move into the high-tech field when Northern Telecom opened a fibre optics plant in Saskatoon. The largest manufacturing concern is the Interprovincial Steel and Pipe Company. IPSCO has benefited from the extensive pipeline construction in the prairie provinces over the past three decades. The company installed a spiral weld mill in 1968 with 16 to 80-inch pipe capacity. In 1980, IPSCO received a contract for large diameter pipe for the Alaska Natural Gas Transmission System. Its mill was subsequently expanded from 490 to 680 kilotonnes in 1981.

Saskatchewan has a small forest products industry. Commercial forests cover 58,000 square miles of the provinces land area. Major processed products are building materials and kraft pulp. Real Domestic Product in the forestry sector expanded rapidly during the 1960s at an average annual growth rate of 13.3 percent, slowing in the 1970s to a rate of 1.8 percent.

Potash is the most important mineral product produced in Saskatchewan. In 1980, the value of potash production was over four times the value of uranium production. The province contains 40 percent of world potash reserves. Production began in 1961 and increased rapidly throughout the the 1960s and 1970s as nine new mines opened. Value of production increased 630 percent between 1971 and 1980. This was largely due to high prices late in the decade, given that volume of production increased 110 percent over the same period. Expansion plans for the 1980s include the Potash Corporation of Saskatchewan's new $600-million mine at Bredenbury and a $430-million expansion of the Lanigan mine.

Uranium was discovered in the province's north in the 1950s and was brought into production that decade. However, it was not until the 1970s that high prices stimulated a major exploratory effort culminating in mine construction and increased output. In 1975, Gulf Canada and Eldorado Nuclear opened mines at Wallaston Lake and Uranium City, respectively. In addition, a large mine was built at Rabbit Lake

and became operational in 1976. These developments resulted in an increase in uranium production of 230 percent to 4838 pounds in 1976. Further developments included the first phase of the Cluff Lake project which was completed in 1979. By 1980, provincial production had increased to 6193 pounds. In 1979, 60 percent of Canada's hard rock exploration expenditures occurred in Saskatchewan. The result was four new uranium discoveries. Projects currently under construction are the second phase of Cluff Lake and a $400-million project at Key Lake.

Saskatchewan is Canada's second largest producer of crude oil, although production peaked in 1966. Much of Saskatchewan's oil production and reserves are of heavy gravity crude. Because few refineries are capable of handling heavy crude, over 40 percent of production since the early 1970s has gone for export. Plans for a $1-billion heavy oil upgrader are under consideration, but all prospective participants are not convinced that the project will prove commercially viable. Oil activity has been highly cyclical. Between 1950 and 1957, expenditures on exploration and development rose from $9.5 million to $91.5 million. Expenditures reached the $95-million mark in 1965 and it was not until 1978 that this level was surpassed. Over the period 1978 to 1981, $962 million were spent with the majority of funds allocated to finding heavy crude in the Lloydminster area.

Saskatchewan has significant deposits of lignite coal concentrated in the areas of Estevan, Willow Bunch, Wood Mountain and Cypress. After the relative stagnation of the 1960s, coal production took off during the 1970s at an average annual rate of 7.7 percent per year between 1971 and 1981. By 1981, the province was producing 17 percent of Canada's coal. Most of this production was destined for the electric power industry. In addition to supplying the provincial utility, Saskatchewan Power Corporation (SPC), lignite is shipped to Ontario for use at Ontario Hydro's Thunder Bay generating station. These shipments totaled 604,000 tonnes in 1981.

In 1980, 63 percent of electrical energy produced in Saskatchewan came from coal, 28 percent from hydro, and 9

percent from gas. Much of the province's steam-fired capacity was installed in the 1950s, although major additions were made to the 875-megawatt (MW) Boundary Dam station in 1969-70, 1973 and 1978. In contrast to most provinces, hydro development followed thermal development, with two hydro dams, Squaw Rapids and Coteau Creek, brought in service in the 1960s. SPC recently purchased the Island Falls hydro plant built by Churchill River Power Company Ltd. in the 1920s. Ongoing investment includes a coal-fired project at Poplar River near Coronach. The station's first 300-MW unit was installed in June 1981 at a cost of $335 million and the second generating unit is nearing completion. In part because of controversy surrounding coal-fired pollution, SPC is continuing its development of hydro power. The Nipawin Dam will be completed by 1986 at an estimated $600-million. Among the province's other long-term investment opportunities are additional lignite stations, nuclear energy, and electricity from waste.

Service industries account for 58 percent of Saskatchewan employment and over 60 percent of value added. Since 1961, commercial employment has shown the fastest growth, tripling in the twenty years to 1981. Investment by these industries as a proportion of total investment has been lower than in other provinces.

A.9 Alberta

In the post-war era, Alberta has undergone a major transformation from an economy based primarily on agriculture to one based on energy. Per capita investment in this province has traditionally been above the national average because of the capital intensity of its major industries, agriculture and mining (predominantly oil and gas exploration and development). Through the 1950s and 1960s, real investment grew steadily, although at a rate below the national average. In the 1970s investment spending took off at more than three times the national rate of growth. Leading the way were the oil and gas sector, construction and services. Table A.9 illustrates these trends.

Alberta was originally built around agriculture. This sector is still very important to the local economy.

TABLE A.9

INVESTMENT IN ALBERTA

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities (% of total)	Services	Govern-ments	Housing
1951	870	38.8	7.1	6.2	5.9	8.9	15.0	18.3
1952	1066	34.3	11.3	8.4	4.3	6.8	18.3	16.6
1953	1178	31.1	11.9	7.7	4.1	8.0	17.3	19.8
1954	1003	30.6	6.1	9.3	5.0	7.4	17.9	23.7
1955	1059	35.3	7.6	8.3	4.6	6.8	15.5	21.9
1956	1243	34.0	12.3	9.7	4.9	4.7	14.1	20.3
1957	1076	31.5	7.2	13.7	4.5	6.2	15.3	21.7
1958	1111	28.8	7.6	12.4	4.2	6.9	12.6	27.3
1959	1122	32.1	7.9	9.6	4.2	7.1	14.0	25.2
1960	1058	33.9	6.6	12.9	4.1	7.9	14.2	20.3
1961	1129	40.7	3.3	11.1	4.2	6.3	12.9	19.4
1962	1017	36.6	4.8	8.0	4.6	6.9	12.9	26.3
1963	1001	41.0	3.7	10.2	4.5	8.3	10.8	21.5
1964	1066	42.0	4.8	10.9	3.9	8.2	9.5	20.7
1965	1158	41.3	5.7	11.7	4.2	7.7	10.6	18.8
1966	1294	40.1	4.4	13.3	4.1	7.1	11.7	19.2
1967	1312	37.7	4.5	13.2	4.6	7.5	10.7	21.8
1968	1318	35.4	6.1	12.9	5.4	7.4	9.6	23.2
1969	1366	35.6	4.5	12.9	4.6	8.8	9.4	24.2
1970	1324	35.3	6.7	14.2	5.3	8.2	10.2	20.2
1971	1313	35.1	6.2	10.9	5.1	7.1	9.9	25.8
1972	1367	33.1	7.9	9.8	5.3	10.6	10.1	23.3
1973	1521	33.1	11.2	9.1	4.5	12.6	9.8	19.6
1974	1689	35.7	8.6	9.6	6.1	11.1	11.4	17.6
1975	1890	37.5	6.4	11.4	5.6	10.2	11.6	17.3
1976	2334	36.6	6.5	8.0	7.1	9.4	8.3	24.2
1977	2312	37.0	6.5	8.6	5.1	10.5	9.0	23.3
1978	2476	35.0	7.9	7.1	3.8	12.1	8.1	26.0
1979	2749	37.3	7.1	6.1	4.0	15.4	7.1	23.0
1980	2843	41.6	5.0	7.7	4.6	14.5	7.2	19.4

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

Cereal grains and livestock are the two main agricultural products. Between 1961 and 1980, Real Domestic Product (RDP) in agriculture fell from 5.4 percent to 4.5 percent of total RDP. Food processing is also an important manufacturing activity, accounting for 25 percent of value added in manufacturing. Almost 10 percent of manufacturing investment in the 1970s was devoted to food processing.

Although oil production has been declining steadily since its peak in 1973, well-head prices have increased such that the value of production has shown consistent growth. In 1979, the value of oil production (excluding synthetic crude) was four times its 1973 value, that is, $5.7 billion versus $1.8 billion. Both output and the value of natural gas production increased over the same period. Gas production could be higher as there have been significant quantities of shut-in gas in recent years. Markets have been restricted by the impact on U.S. demand of high export prices.

Expenditures on oil and gas exploration and development rose steadily throughout the 1950s and 1960s at average annual rates of 7.5 and 7.1 percent, respectively. During the 1970s, spending increased at an average rate of 33.1 percent per year. Expenditures totaled $5.6 billion in 1980. While a portion of this increase can be attributed to inflation, there has unquestionably been a major expansion in the search for oil and gas. Towards the end of the 1970s, substantially more funds were being channelled into exploratory drilling than into development drilling. In contrast, the practice of the 1960s and early 1970s had been to spend marginally more on development wells.

The year 1981 saw a decline in expenditures by the petroleum industry. It marked the beginning of an exodus of drilling rigs south to the United states brought about by the deregulation of oil prices in that country. In the fall of 1980, the Canadian government introduced its National Energy Program which changed substantially regulations affecting the oil and gas industry. The effect on cash flows and uncertainty caused by a raft of new regulations contributed to a major slowdown in activity.

There are two commercial oil sands plants operating in northern Alberta. The Suncor plant, originally known as the Great Canadian Oil Sands, was built in the 1960s and became operational in 1967. Since startup, Suncor has averaged production just under its design capacity of 45,000 barrels per day (b/d). The $2 billion-plus Syncrude operation, built in the 1970s, is capable of producing 140,000 b/d. The plant came on stream in 1978, but technical problems have prevented it from operating at capacity. In addition to these two commercial projects, there are over fifty pilot operations testing different in situ technologies. Capital expenditures on oil sands exploration and development totaled almost $4 billion by 1981, $3 billion of which has been since 1975. Included in these figures are the preliminary expenditures of the Alsands Consortium and the Esso Resources Cold Lake project--two projects that were cancelled in 1982.

A major oil sands plant has substantial economic benefits not only for Alberta but also for the rest of Canada, especially Ontario and Quebec. The construction of a plant in the order of Syncrude requires over 50,000 man-years of employment and billions of dollars of equipment purchases.

As Alberta's oil and gas resources have been discovered, an extensive gathering and transmission network has been developed, linking producing fields to markets. By 1960, 3,331 miles of oil pipelines and 5,520 miles of gas pipelines had been laid. The Interprovincial Pipe Line built in 1950 connecting Edmonton to Superior, Wisconsin was extended to Sarnia, Ontario in 1963 and subsequently to Montreal in 1976. The Transmountain Oil Pipeline carrying crude to Vancouver commenced operations in 1953. TransCanada Pipeline's original system commenced operations in 1958. In the 1960s, over 5,000 miles each of oil and gas pipelines were laid to market increasing consumption in central Canada and the United States. Oil pipeline construction tapered off in the 1970s as new mileage increased by only 26 percent. However, the connection of new natural gas fields found in the 1970s resulted in an 86 percent increase in mileage in the same period. The expansion of the Alberta Gas Trunk Line accounted for the largest part of this expansion. The western leg of the Alaska Natural Gas Transmission System was completed and put in operation in 1981. The eastern leg was

completed in 1982 with first deliveries commencing in the fall. Construction of the rest of the system has been delayed. Pipe for this line has been provided from the Stelco Mill in Camrose, Alberta, and the IPSCO mill in Regina, Saskatchewan.

The growth in the number of natural gas processing plants since 1970 has been phenomenal. In 1981, there were close to 500 plants in operation. This compares to 190 in 1970 and only 60 in 1960. These facilities cost between several hundred thousand dollars and $40 million, depending on capacity. The exceptions are 'sour gas' processing plants where costs are of the order of $100 million each. Between 1971 and 1981, $1.9 billion were spent on natural gas processing plants. In the previous two decades, combined outlays for such facilities accounted for only $800 million of oil and gas development expenditures.

An important co-product of natural gas processing is sulphur. Low prices early in the 1970s led to enormous stockpiles of sulphur, after brisk sales for most of the previous decade. Since the mid-1970s, increased demand, partly from petrochemical plants, has depleted sulphur inventories, and higher prices have raised the value of sulphur sales. Such sales grew 774 percent between 1972 and 1979.

Vast quantities of coal lie in the plains, foothills and mountains of Alberta. The province produces about one-third of Canada's coal. Forty percent of this is destined for out-of-province consumption. Ontario Hydro is a major purchaser of thermal coal, while the Japanese market accounts for the majority of metallurgical coal sales. This latter market has been the source of growth for coal production in the 1970s, reversing the falling demand of the 1950s and 1960s. The balance of production is taken by the province's electric utilities.

In 1970, the Cardinal River mine at Hinton commenced annual shipments of 1.1 million tons of metallurgical coal to Japan. Shipments were subsequently increased to 1.7 million tons in 1974. In addition, the Smoky River deposit at Grand Cache was exploited in the early 1970s in order to serve Japanese markets. The Coal Valley mine at Hinton opened in

1978 and began shipping coal to Ontario Hydro and West Germany.

Alberta's sub-bituminous coal resouces have provided the mainstay of its electric utility industry over the last thirty years. In 1980, 72 percent of provincial electric energy came from coal-fired generation, 21 percent from gas-fired generation, and 7 percent from hydro. A number of mountain hydro plants were built in the 1950s, but most of the investment undertaken in the 1960s and 1970s involved steam-fired generation facilities. Major developments during the 1960s included expansions at the Rossdale gas-fired and Wabamum coal-fired plants, and a 305-megawatt (MW) hydro facility on the Brazeau River. A third coal-fired unit was installed at Alberta Power's Battle River station in 1969, with two more units bringing capacity to 740 MW by 1981. The relative surge in utilities investment came in the latter half of the 1970s, as the Sundance coal facility (2200 MW) was completed and construction started on several projects.

Investment levels are expected to increase in the next few years given that Alberta's investor-owned utilities are projecting load growth of 6 percent or higher. TransAlta Utilities is currently constructing a coal-fired plant at Keephills, west of Edmonton. With its first two units due on stream in 1983 and 1984, this plant is eventually to have six units for a total capacity of 2400 MW. Also under construction is the $1 billion Sheerness facility south of Hanna. This is a joint project between Transalta and Alberta Power scheduled for completion by 1986. Edmonton Power is building an 800-MW station at Genesee which will be completed in 1987 at an estimated cost of $1.2 billion. These projects reflect a preference for exploiting the province's relatively low cost coal resources. However, there may be some diversification away from coal-fired electricity supply. Alberta is planning an $8.2 billion hydro project on the Slave River for the 1990s, and is constructing a high voltage interconnection with the hydro-based B.C. Hydro system due in service in 1984.

A high growth sector in the 1970s was the petrochemical industry, which currently accounts for more than one-quarter of Real Domestic Product in manufacturing. This

industry arose because of abundant supplies of natural gas feedstock. Major products of the Alberta industry include methanol, ethylene, polyethylene, polyvinyl chloride, and fertilizer products such as ammonia, urea and nitrogenous and phosphatic fertilizers. The late 1970s saw an expansion in plant capacity, as Alberta geared up to serve the burgeoning world market for petrochemicals. The province completed its first world scale facility in 1979, a 1.1 billion pounds per year ethylene-from-ethane plant at Joffre near Red Deer. This plant was built by Alberta Gas Ethylene Company at a cost of $250 million. Currently, there are numerous projects which have been delayed by the world recession, although several are going ahead such as the ethylene and polyethylene plants at Joffre scheduled for completion in 1987 and 1984, respectively. Also to come on stream during the 1980s are a benzene plant at Fort Saskatchewan, an ammonia and urea facility at Redwater, styrene and olefins plants at Scotford, and an ethylene glycol facility at Prentiss. Individually, these projects will cost between $250 and $600 million. In addition, the provincial cabinet recently approved construction of the world's largest methanol plant at Waskatenau, northeast of Edmonton. The plant is scheduled for completion in 1984 at an estimated cost of $650 million, and will produce 1.65 million tonnes of methanol per year.

Alberta's advantage in petrochemical production is its secure, plentiful supply of natural gas feedstock which can be obtained at prices lower than the out-of-province selling price. Its major disadvantage is distance from markets in the United States and central Canada. The feedstock price currently enjoyed by the industry will need to continue in order to offset the additional transportation costs required to ship product to market.

The number of refineries operating in Alberta has fallen from a high of twelve relatively small operations in 1952 to the current number of six. However, capacity has increased fourfold; almost all of this increase occurred in the 1970s. Gulf Oil replaced its twenty-year-old Edmonton plant with an 80,000 b/d plant which began operating in 1971. In 1975, Imperial Oil replaced its small existing refinery with a 141,700 b/d plant. These developments increased refining capacity to 262,400 b/d, 90 percent of which is

located in Edmonton. Total capacity in 1981 stood at 293,000 b/d and was operated at 95 percent capacity. A new refinery of Turbo Resources just north of Calgary with a 30,000 b/d capacity began operating in late 1982.

In 1980, the construction industry was the largest goods-producing industry in Alberta's economy, accounting for one-third of Real Domestic Product in this sector. Construction activity in oil and gas and other energy-related projects was the source of much of the province's employment.

The construction of Syncrude and several major petrochemical plants in the 1970s provided a considerable stimulus. The rapid growth of population in the province since the early 1970s has also increased residential construction activity. Twenty percent of Canada's housing starts have been located in Alberta since 1977, whereas in the previous 25 years this figure was fewer than ten percent. Starts peaked in 1978 at 48,000 units. The construction of commercial buildings, particularly in Calgary and Edmonton, also contributed in large part to Alberta's rapid expansion during the 1970s.

Service-producing industries account for two-thirds of Alberta's employment and over 50 percent of Real Domestic Product. Much of the growth in this sector can be attributed to the larger size of the Alberta economy arising from the 1970s oil and gas boom and rapid population growth. Wholesale and retail trade, and finance, insurance and real estate were the fastest growing components, as real value added more than doubled in the decade. Real investment growth in these industries averaged 18.3 percent annually in the 1970s. The initiation of the Heritage Savings Trust Fund and the massive financing requirements of Syncrude and other large energy developments contributed to the higher level of financial services offered in the province.

A.10 British Columbia

British Columbia relies on the strength of export markets to keep its economy growing. The vagaries of world markets have contributed to the boom and bust cycle of the provincial economy, making orderly industrial development

difficult. Forestry and mining are key industrial sectors. Within manufacturing, the pulp and paper and lumber industries account for 50 percent of value added. Because B.C. industry is relatively capital intensive, per capita investment exceeds the national average. The decades of the 1950s and 1960s saw real investment grow faster than the national average, but for most of the 1970s investment has been relatively stagnant (see Table A.10). Investment in primary industries was particularly strong in the 1960s but showed signs of weakness during the next decade.

Agriculture has declined in relative importance in British Columbia. Between 1961 and 1980, the share of total Gross Domestic Product (GDP) fell from 2.5 percent to 1.5 percent. Certain products remain important to particular regions of the province including dairy production and market crops in the Lower Fraser Valley, fruit in the Okanagan Valley, livestock in Cariboo Country and cereal grains in the Peace River Country.

Fishing is dominated by the salmon fishery. However, since 1971 the emergence of a herring fishery has contributed greatly to growth in this industry. Greater government regulation, the declaration of a 200-mile limit and treaty negotiations with the United States have helped to protect the resource base which has been threatened by technological advances in harvesting. While the total number of fishing vessels has been decreasing, landings have been increasing. There has been a significant decline in the number of small boats (less than 10 tons) accompanied by a rise in the number of larger more efficient fishing vessels.

Food and fish processing remains an important manufacturing activity, contributing 10 to 15 percent of manufacturing value added. Investment in food processing accounted for about 10 percent of manufacturing investment for most of the 1970s, up substantially from the 1960s.

Forestry is crucial to employment and economic growth in British Columbia, but remains highly dependent on the export market which accounts for 80 percent of forest product shipments. The logging industry, along with the downstream operation at sawmills, plywood and veneer mills and pulp and

TABLE A.10

INVESTMENT IN BRITISH COLUMBIA

	Total Per Capita ($1971)	Primary	Manu-facturing	Trans-portation	Utilities	Services	Govern-ments	Housing
				(% of total)				
1951	771	13.9	19.4	10.0	16.8	8.1	12.4	19.5
1952	804	10.0	20.6	11.5	23.0	4.7	12.1	18.1
1953	802	9.1	19.9	13.0	18.1	7.6	12.5	19.8
1954	659	8.9	15.5	11.2	11.7	10.5	13.8	28.4
1955	831	10.9	17.7	11.0	9.9	7.4	10.9	32.1
1956	1163	8.7	19.5	17.6	14.2	5.9	12.4	21.7
1957	1277	9.0	19.3	20.5	13.5	5.4	13.8	18.5
1958	874	7.6	11.1	17.8	12.0	6.8	15.8	29.0
1959	851	8.3	9.2	11.7	11.1	10.3	20.3	29.3
1960	783	9.6	13.8	12.1	9.4	9.5	20.5	25.0
1961	778	14.0	11.1	18.2	7.6	8.5	19.0	21.6
1962	790	15.9	15.0	11.7	7.9	8.0	17.4	24.2
1963	795	12.9	16.9	10.9	8.6	9.3	15.9	25.4
1964	953	15.3	18.9	12.9	9.0	8.1	12.7	23.0
1965	1174	15.0	19.3	9.3	14.4	7.8	11.9	22.4
1966	1246	12.9	20.2	11.7	17.5	6.9	10.1	20.8
1967	1218	14.2	14.1	12.7	18.2	8.5	10.1	22.3
1968	1085	15.9	10.8	13.4	14.2	9.4	10.5	25.8
1969	1148	17.3	14.4	12.2	9.6	9.7	10.3	26.5
1970	1114	17.3	15.9	13.7	10.2	8.4	9.1	25.3
1971	1326	20.0	14.8	14.3	7.4	8.9	10.2	24.4
1972	1232	12.5	12.3	13.0	8.1	12.5	12.7	28.9
1973	1304	10.8	9.9	16.2	9.8	13.2	11.0	29.0
1974	1295	12.0	10.4	14.3	11.2	11.7	11.7	28.7
1975	1198	10.0	9.0	13.6	13.5	13.1	11.7	29.1
1976	1262	12.7	8.3	11.1	10.8	11.3	11.1	34.6
1977	1249	14.1	10.6	9.4	11.4	11.8	11.9	30.8
1978	1268	14.9	9.9	9.9	12.3	13.4	10.9	28.7
1979	1371	18.4	11.7	11.1	11.0	14.2	8.8	24.8
1980	1528	20.6	13.9	10.2	8.0	13.0	8.3	26.0

SOURCE: Based on data from Statistics Canada, Private and Public Investment in Canada, 61-206.

NOTES: 1) Primary includes agriculture, forestry, fishing, mining and construction
2) Transportation includes transportation and communication
3) Services includes commercial services, trade and finance
4) Governments includes government departments and institutions

paper mills, have historically accounted for almost 15 percent of provincial value added and about 13 percent of employment. Investment in forest product industries has been extremely cyclical. Major periods of expansion occurred in the mid-1950s, mid-1960s, early 1970s, and again in the period up to 1980. Each of these expansions centred on the capital intensive pulp and paper industry. The recent expansion of the industry's capacity although several projects currently under construction are being completed. Extremely soft markets in the United States and other Pacific Rim countries have resulted in mill closings and high unemployment.

Mining is British Columbia's second largest industry. The province is the world's largest exporter of copper and an important producer of other minerals including molybdenum zinc, lead, gold and silver. Growth in metallic mineral GDP (including processing) over the period 1961-72 proceeded at 7.8 percent per year. Between 1978 and 1980, this increased to 18.8 percent. Much of this increase was due to inflation as opposed to higher levels of production. The story in the 1980s should be different as several new mines come into production. A number of small gold mines and a new silver mine, which almost doubled the province's silver capacity, opened in 1981. Also in 1981, Teck Corporation commenced work on a $150-million copper-molybdenum mine, Amax of Canada expanded its Highland Valley mine at a cost of $154 million, and Noranda mines began construction on a $50-million copper-zinc mine at Revelstoke. In addition, a new $200-million zinc electrolytic smelting plant was installed at Trail. The current world recession is, however, having a severe impact on metal mining expansion plans.

Of even greater importance than the above-noted minerals is coal. Coal production declined steadily through the 1950s, dropping from 1.6 million tonnes to 0.7 million tonnes between 1950 and 1959. Production then increased marginally through the 1960s until new mines were opened in 1970 to export metallurgical coal to the Japanese steel industry. A major expansion occurred in the 1970s, with output rising from 3.2 to 11.8 million tonnes between 1970 and 1981. However, output was curtailed in 1982 and will remain low in 1983. Nevertheless, the province's huge north-

east coal deposits are being developed in the 1980s at a cost of $3 billion. Other coal mines will be expanded to take advantage of prospective long-term growth in Pacific Rim demand.

British Columbia's oil and gas production comes from the northeastern part of the province. Significant expenditures on exploration and development did not occur until the 1950s, while the first production of natural gas and oil took place in 1954 and 1955, respectively. The province's first natural gas plant was subsequently built in 1957. Through the 1960s, production increased such that oil production reached 4 million cubic metres in 1970. Gas production has declined slightly since 1973, although rising wellhead prices in the latter part of the decade resulted in a sharp increase in revenue. Four gas plants were added in the 1960s and another four at the end of the 1970s. As a result of higher prices, exploration activity picked up sharply after 1975, increasing from $58 million to $340 million by 1981. After 1977, development expenditures also picked up, with almost one-quarter of expenditures being allocated to natural gas processing plants. The drop in activity in 1981 hit British Columbia especially hard as exploration and development expenditures fell from $847 million to $464 million, a decline of 45 percent.

There are two major oil pipelines in the province. The Trans Mountain line connecting Edmonton and Vancouver was built between 1952 and 1953. In 1961, Western Pacific laid 505 miles of pipeline connecting the northeast oilfields to the province's southern market. Aside from minor increases in gathering systems during the 1960s, no further construction of oil pipeline has taken place.

The major gas pipeline is the Westcoast Transmission line. The southern end was prebuilt in 1955. The project continued through 1956 and was completed in 1957. In 1971, Westcoast looped 236 miles of the pipeline and then extended the mainline north in 1972. The Inland pipeline was built in 1959 through the southeast portion of the province. This line was subsequently looped in 1974 and 1975. Pacific Northern Gas constructed a 450-mile line to serve the north central portion of the province in 1968.

The western leg of the Alaska Natural Gas Transmission System was completed in 1981 but is carrying less gas than its 244 MMcf capacity permits. The major development of the 1980s will be the construction of a natural gas pipeline to Vancouver Island and an associated distribution network. The cost of the transmission line will be about $500 million.

British Columbia currently has seven small refineries operating at various sites throughout the province. Three of these were built prior to the Second World War and another three during the 1960s. The newest plant, operational since 1967, is the Husky Oil refinery in Prince George although Gulf's Port Moody Plant was expanded from 18,000 to 30,000 barrels per day (b/d) in 1970. Shell Canada is planning to triple the capacity of its 11,000 b/d Shellburn refinery, with completion expected by 1984.

A major stimulus to investment activity throughout the historical period has been the series of hydroelectric projects undertaken by B.C. Hydro, the provincial electric utility. In 1980, the utility produced 94 percent of its electrical energy from 31 hydro plants located throughout the province. Of these hydro plants, 22 were placed in service between 1950 and 1980. While several smaller projects were completed during the 1950s, the flurry of investment activity came in the mid-1960s with hydro construction on the Peace River. Utilities' share of total investment peaked at 18.7 percent in 1967, one year before first power at the 2415-MW Gordon M. Shrum station. Hydro development continued into the 1970s, resulting in major installations at Kootenay Canal (530 MW), Mica (1735 MW), Seven Mile (405 MW) and Peace Canyon (700 MW).

Currently under construction are the $1.2 billion Cheekye-Dunsmuir transmission line between the mainland and Vancouver Island, and the $1.6 billion Revelstoke dam due in service May 1984. Like other Canadian utilities, B.C. Hydro has been lowering its demand growth projections, with the current 11-year forecast running at 4.3 percent per annum. This had led to the deferment of planned capacity additions, including the 2000-MW Hat Creek coal facility. The next

major generation project will be the Peace Site C development to start in 1984.

Although its manufacturing is dominated by the processing of natural resources, the province is not totally reliant on primary products. Transportation equipment is a major provincial employer. British Columbia is an important truck manufacturing centre and also produces rail cars and other railway equipment. In the fall of 1982, Toyota Motor Corporation announced it would spend $23 million on a plant to produce aluminum wheels for the company's automobiles. Aluminum for the plant, which is scheduled to open in 1985, will probably come from the Alcan smelter at Kitimat. Equipment manufacturers have grown up to supply specialized investment goods to the resource industries. These developments, however, have been relatively ineffective in mitigating the impact of world demand fluctuations on British Columbia's export-oriented economy.

The west coast shipbuilding industry has benefited from oil and gas exploration activity in the Beaufort Sea. Several ice breaking vessels, seismographic research vessels and other equipment for arctic oil development are now under construction.

The construction industry is the largest employer in the province. Critical to the industry have been large resource-based projects in mining, forestry and electric power. High rates of population growth caused by migration have contributed to a healthy residential construction sector. This was particularly the case in the late 1950s and mid-1960s. In recent years, high housing prices in the province's urban centres contributed to record numbers of housing starts--41,585 in 1981 alone. British Columbia's share of national housing starts exceeded 23 percent in 1980 and 1981. This compares with data for the 1950s, 1960s and with data for the 1950s, 1960s and 1970s of 10 percent, 12.3 percent and 14 percent, respectively. In 1982, however, a slowdown occurred.

British Columbia's tertiary sector has developed around resource industries. Especially important are those sectors which move local products to market--railways, ports

and shipping. Over the last twenty years, employment growth has been strongest in the various service industries. The needs of the increasingly urban population and the influential tourism industry have also contributed to the growth of this sector.

CANADIAN ENERGY RESEARCH INSTITUTE

PUBLICATIONS

Studies

No. 1 The Availability of Capital to Fund the Development of Canadian Energy Supplies. J. R. Downs. November 1977 (Price $3.00, 109 pages) ISBN 0-920522-00-9.

No. 2 The Industrial Demand for Oil and Gas in Ontario. DataMetrics Limited. March 1978 (Price $3.00, 119 pages) ISBN 0-920522-01-7.

No. 3 The Effects of Rising Energy Costs on Canadian Industry. Anthony P. Ellison. April 1979 (Price $3.00, 62 pages) ISBN 0-920522-02-5.

No. 4 Potential Markets for Thermal Coal in Canada, 1978-2000: Summary and Conclusions. Canadian Resourcecon Limited. June 1979 (Price $3.00, 27 pages) ISBN 0-920522-03-3.

No. 5 Energy in Canada: Review and Outlook to 1995. W. Brent Friedenberg. July 1979 (Price $10.00, 140 pages) ISBN 0-920522-04-1.

No. 6 Energy Policy and the Balance of Payments: An Outline of the Issues. T. L. Powrie. July 1979 (Price $3.00, 61 pages) ISBN 0-920522-05-X.

No. 7 Oil and Gas Finding Costs. Russell S. Uhler. September 1979 (Price $3.00, 75 pages) ISBN 0-920522-06-8.

No. 8 Energy Use in Canada in Comparison With Other Countries. Z. Charles Slagorsky. October 1979 (Price $3.00, 91 pages) ISBN 0-920522-07-6.

No. 9 Enhanced Oil Recovery Potential in Canada. J. Philip Prince. March 1980 (Price $10.00, 332 pages) ISBN 0-920522-09-2.

Conclusions and Policy Implications from Enhanced Oil Recovery Potential in Canada, Study No. 9. J. Philip Prince. March 1980 (Price $3.00, 32 pages) ISBN 0-920522-10-6.

No. 10 The Impact of Rate Structure Change on Electricity Demand: A Case Study of Calgary Power Limited. Gerard J. Protti and Robert N. McRae. April 1980 (Price $10.00, 182 pages) ISBN 0-920522-11-4.

Overview and Summary from The Impact of Rate Structure Change on Electricity Demand: A Case Study of Calgary Power Limited. Gerard J. Protti and Robert N. McRae. April 1980 (Price $3.00, 14 pages) ISBN 0-920522-12-2.

No. 11 The Impact of a Sharp Oil Price Increase. G. E. Angevine. June 1980. (Price $10.00, 122 pages) ISBN 0-920522-13-0.

No. 12 Benefits and Costs of Oil Self-Sufficiency in Canada. J. A. Dawson and Z. C. Slagorsky. February 1981. (Price $10.00, 97 pages) ISBN 0-920522-15-7.

No. 13 Financing Canadian Energy Resource Development. J. A. Dawson. December 1981. (Price $10.00, 68 pages) ISBN 0-920522-17-3.

No. 14 Impacts of Canada's Uranium Mining Industry. Marvin Shaffer and Associates Ltd. May 1982. (Price $10.00, 87 pages) ISBN 0-920522-20-3.

No. 15 Coal and Nuclear Electricity Fuels: A Regional Analysis. Farhood Rahnama. June 1982. (Price $10.00, 81 pages) ISBN 0-920522-21-1.

No. 16 Alternative Transportation Fuels in Canada. Z. Charles Slagorsky. July 1982. (Price $10.00, 112 pages) ISBN 0-920522-23-8.

No. 17 Energy and Regional Investment in Canada. Gordon W. Douglas and Ellen F. Battle. March 1983. (Price $20.00, 114 pages) ISBN 0-920522-28-9.

No. 18 Household Energy Savings: Options for the Future. Brian D. Sumner and Barbara E. Green. March 1983. (Price $20.00, 194 pages) ISBN 0-920522-27-0.

Client Research Reports

81-1 Models for Energy Policy Analysis: A Survey. Kenneth D. Foat, Gerard J. Protti and Gordon W. Douglas. July 1981. (Price $10.00, 121 pages) ISBN 0-920522-16-5.

82-1 The Economics of Improved Energy Efficiency in New Calgary Housing. Barbara E. Green. March 1982. (Price $10.00, 55 pages) ISBN 0-920522-18-1.

82-2 Interregional Economic Impacts of the Alberta Alsands Project. Gordon W. Douglas and J. A. MacMillan. September 1982. (Price $15.00, 78 pages) ISBN 0-920522-24-6.

Working Papers

78-1 Drilling and Field Construction Costs in the Canadian Petroleum Industry. Gordon M. Engbloom, Confer Consulting Limited. January 1978 (Price $3.00, 83 pages).

78-2 Some Supply Price Estimates for Synthetic Crude Oil in Canada. Z. Charles Slagorsky. April 1978 (Price $3.00, 42 pages).

78-3 Past and Future Energy Costs in the Canadian Economy. Anthony P. Ellison. April 1978 (Price $5.00, 136 pages).

78-4 Canadian Electric Utility Industry Costs, 1960-1990. Gerard J. Protti. May 1978 (Price $10.00, 218 pages).

78-5 Enhanced Oil Recovery Potential in Canada - A Methodological Preview. J. Philip Prince. June 1978 (Price $10.00, 184 pages).

78-6 Regional Energy and Production Data for Canadian Manufacturing Industries: 1962-74. Robert N. McRae and Alan R. Webster. July 1978 (Price $5.00, 106 pages).

78-7 Regional Demand for Energy by Canadian Manufacturing Industries. Robert N. McRae. October 1978 (Price $5.00, 132 pages).

79-1 An Input-Output Analysis of the Effects of Rising Energy Costs on Canadian Industries. Anthony P. Ellison. April 1979 (Price $10.00, 246 pages).

79-2 Potential Markets for Thermal Coal in Canada, 1978-2000. Canadian Resourcecon Limited. June 1979 (Price $15.00, 321 pages).

79-3 Inter-City Comparisons of Canadian Household Energy Costs. Darcy-Gail Ackerman. June 1979 (Price $3.00, 77 pages).

80-1 Government Incentives in Canada's Petroleum Industry. W. B. Friedenberg, Z. C. Slagorsky, and A. J. Walsh. March 1980 (Price $3.00, 43 pages).

80-2 A Regionalized Electricity Model: Preliminary Analyses. Kenneth D. Foat and Gerard J. Protti. April 1980 (Price $3.00, 61 pages).

80-3 Alternative Future Supplies of Oil in Canada and Their Costs. Z. Charles Slagorsky. May 1980 (Price $3.00, 36 pages).

80-4 Prospects for Reduced Oil Consumption in Canada. W. B. Friedenberg and A. J. Nixon. May 1980 (Price $3.00, 34 pages).

81-1 Crude Oil Supply and Demand: Major Issues and Alternate Scenarios. Douglas J. Haughey. July 1981 (Price $7.00, 158 pages).

81-2 Natural Gas Pricing in Canada: An Economic Analysis. Andrea J. Nixon. October 1981 (Price $5.00, 116 pages).

82-1 Potential for Reducing Oil Demand Through Conservation. Georgette Habib. September 1982 (Price $7.00, 47 pages).

83-1 Development Options for Maritime Coal. John A. Dawson. January 1983 (Price $7.50, 42 pages).

Discussion Papers

82-1 Significance of Interregional Feedbacks for Canadian and Regional Energy Policy Decisions. Gordon W. Douglas and James A. MacMillan. March 1982 (Price $2.00, 10 pages).

Proceedings

Markets for Canadian Uranium. Proceedings of a Seminar Held on October 25, 1979, Calgary, Alberta. (Price $10.00, 89 pages) ISBN 0-920522-08-4.

Economic Potential for Alternative Transportation Fuels: Methanol, Ethanol, Propane, Liquified Coal, Compressed Natural Gas and Hydrogen. Proceedings of a Seminar Held on November 17, 1981, Calgary, Alberta. (Price $10.00, 83 pages) ISBN 0-920522-19-X.

World Oil Market Conference. Proceedings of a Conference Held on October 18, 1982, Calgary, Alberta. Edited by Shane S. Streifel. (Price $50.00, 220 pages) ISBN 0-920522-25-4.

Annual Report

Annual Report of the Board of Directors for the Period April 1, 1981 to March 31, 1982. ISBN 0-920522-22-X.

POOR

QUALITY

ORIGINAL